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ABSTRACT

This competency-based curriculum is designed to be a handbook for the construction trades. It includes all competencies a student will acquire in the course of building a complete house. Based on a survey of Alaskan construction employers and employees, the handbook stresses both principles and skills. The 23 units are presented in the sequence that they would be used by someone building a house from start to finish; however, the units can stand alone as complete courses. The curriculum is divided into basic skills and specialized construction activities. The handbook is organized in seven sections. Section 1 introduces the concept of competency-based curriculum, while Section 2 provides the scope, sequence, and hierarchy of construction education competencies. Section 3 presents the curriculum, including the competencies and tasks for construction trades instruction. These are categorized as basic (employability skills, health and safety, hand and power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection) and specialized (foundations and forming; masonry and concrete; blocks and bricks; framing--subfloor/floor, walls, and roofing; roof finishing; plumbing and heating; wiring; windows and doors; exterior and interior finish; and cabinets). Section 4 contains course descriptions to assist school districts in developing their vocational programs. Section 5 contains a curriculum analysis matrix to be used in determining competencies to be included in specific courses. Section 6 contains a sample skills card for evaluating and recording student progress. Section 7 lists resources and materials available in Alaska and the rest of the country. (KC)

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CONSTRUCTION TRADES CURRICULUM

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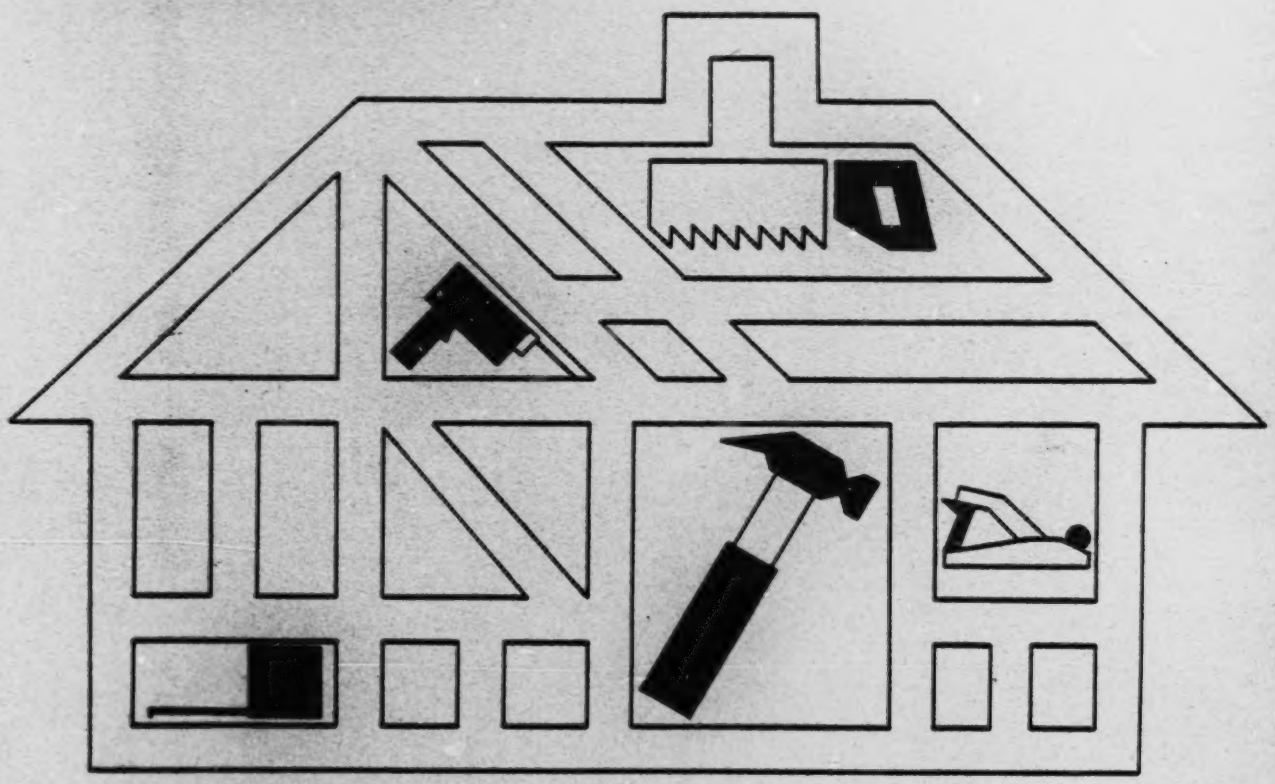

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CONSTRUCTION TRADES CURRICULUM

Bill Sheffield, Governor

Developed by the. . .

ALASKA DEPARTMENT OF EDUCATION
Adult and Vocational Education

Marshall L. Lind, Commissioner

Gerald D. Hiley, Director for Vocational Education

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Forward

This competency-based curriculum is designed to be a handbook for the construction trades. It includes all competencies a student will acquire in the course of building a complete residential dwelling according to local and national building codes, accepted practices, and the latest energy and resource conservation techniques.

Development of this handbook began with a survey of Alaskan construction employers and employees. Their priorities regarding the skills and knowledge students need to acquire to survive and thrive in the industry form the basis of this handbook. For example, industry's emphasis on the importance of communication and personal skills is reflected in the long and detailed first unit, employability skills.

The handbook also stresses the importance of understanding the principles associated with the various elements of construction: Units begin with principles, science, and math so that students will have conceptual frameworks to which they may add the details of various techniques. Alaska requires construction techniques tailored to local environmental, economic, and transportation concerns. As a result, rather than advocate specific construction techniques, the handbook advocates a general approach. It encourages selecting the most appropriate energy and material-efficient construction techniques. Meeting this objective wil require many considerations including the structure's intended use, its ultimate site, and the shop facilities available.

The 23 units are presented in the sequence that they would be taught by someone building a house from start to finish. However, the units stand on their own and can be used as complete courses. The curriculum is also divided into two categories, basic skills and specialized construction activities. The basic includes Employability Skills, Safety and Health, Technical Skills, and Resource Conservation, competencies which are fundamental but not necessarily restricted to the construction trades. Specialized construction skills include Foundations, Framing, Finishing, and Utilities.

During two audioconferences, educators from around the state provided input for completing the draft. A task force of three educators convened to complete the handbook.

The handbook is organized in seven sections:

Section I introduces the concept of competency-based curriculum. The role of vocational educators in curriculum planning, implementation and evaluation is also included.

Section II provides the scope, sequence, and hierarchy of construction education competencies.

Section III presents the curriculum, it includes the competencies and tasks for construction trades instruction.

Section IV contains course descriptions to assist school districts in developing their vocational programs.

Section V contains the curriculum analysis matrix to be used in determining competencies to be included in specific construction courses.

Section VI contains a sample skills card for evaluating and recording student progress.

Section VII lists information on resources and specific materials available in Alaska and the rest of the nation.

It is recommended that all students participate in career awareness and exploration experiences to help them understand the connection between school and work and make career plans.

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Kelly Hegarty, Anchorage Outreach Center
Sam Hill, Designs In Wood, Anchorage
Don Hoffman, Carpenters Union, Fairbanks
John Knabe, Plumbers & Pipefitters Trainer, Fairbanks
Bob Lutje, Fairbanks
John McKinnon, RMC Contractors, Juneau
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Jack Anderson
University of Alaska
Juneau

Michael Cleary
Klawock High School
Klawock

Bobby Cloyd
Hutchison Career Center
Fairbanks

Richard Debusman
Wasilla High School
Wasilla

Kenneth Kristenson
Nome-Beltz High School
Nome

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Karen Ryals
Assistant Administrator for Vocational Education
Office of Adult and Vocational Education
Alaska Department of Education
June 1986

Introduction to Competency-Based Curriculum

Competency-Based Curriculum

Vocational education should be directed toward the skills, knowledge, and attitudes needed for successful employment. Changes in technology are affecting the job requirements in construction. Such changes require construction educators to continually update their curriculum in order to prepare students for competition in the job market.

An effective method for delivering vocational education is through a competency-based curriculum. This curriculum is based on a task analysis of the key occupations in construction. Once a competency-based curriculum is set in place, student performance must be measured on levels of proficiency in those competencies. Thus, the critical features of competency-based education are:

1) validating competencies to be included in the curriculum; and
2) evaluation of student competency levels.

This curriculum handbook sets direction for local curriculum developers. It provides a framework for developing courses of study and lesson plans in local schools.

Curriculum Based On Competencies

Competence refers to the adequate performance of a task. The task may be evaluated according to the performance or process, the product, or both.

Competency-Based Vocational Education consists of programs that derive their content from the tasks performed in each occupation/job and assess student performance on the basis of preset performance standards.

Learning materials define the competencies the student is to learn, the criteria by which the student will be evaluated, and the conditions under which the evaluation will occur.

Competency-based instruction places emphasis on the ability to do, as well as on learning how and why. Student performance and knowledge are individually evaluated against the stated criteria, rather than against group norms.

The competency process utilizes a checklist of attitudes, knowledge and skills that are commonly needed by entry level employees in construction occupations. In developing this curriculum handbook, a cross-section of construction professionals were asked to respond to the checklist on the basis of needs within their own establishments. The checklists were tallied and summarized to determine which attitudes, knowledge and skills were common to firms in Alaska. Also, the competencies in each area were ranked as to decreasing importance.

Student Performance Assessment

A curriculum becomes competency-based when students are assessed on the basis of their competence. Sample skill cards are provided in this guide for teachers who wish to use them in assessing the competency levels of their students. The card has four levels of proficiency which allow continued development of skills. The card can be used to monitor students' progress as they move between construction classes, between teachers and grade levels and between school and work. The completed skills card is an important part of a placement portfolio when students begin their job searches.

Curriculum Delivery Systems

Vocational Student Leadership Organizations

Some of the competencies in this curriculum guide cannot be fully met in traditional classroom and lab settings. The Vocational Industrial Clubs of America (VICA) is a delivery system which can be integrated into the regular school program. Human relations skills as well as job skills will be enhanced by student participation in VICA. VICA activities should complement instruction in the construction classroom and lab. They should be integrated as a curriculum delivery system and not allowed to become an extracurricular activity.

Cooperative Work Experience

Some of the competencies identified in this guide cannot be fully developed at a school site. A work station in the community offers realistic experiences in fulfilling the program goals in career development and human relations. Cooperative Work Experience offers an excellent vehicle for the delivery of instruction. With well developed training plans, teachers and employers can cooperate to prepare students for employment. Cooperative Work Experience extends the instructional program beyond the availability of equipment and instructor time at the local school. Teachers and employers must maintain regular communications to assure that students are receiving a high quality experience.

The Rural Student Vocational Program (RSVP) provides a two week fulltime work experience for students from rural areas where job stations are limited or non-existent.

The Job Training Partnership Act (JTPA) provides on-the-job experience to disadvantaged youth in both urban and rural areas.

Role of Instructor in Curriculum Planning, Implementation and Evaluation

The vocational instructor fulfills many roles which include the following responsibilities:

-- Prepares a written vocational program plan.

-- Develops and maintains a written program philosophy with objectives that support the philosophy.

-- Maintains a written list of competencies identified as needed for the program area.

-- Devises and maintains a classroom management system for implementing the curriculum materials provided for the program area.

-- Evaluates the curriculum content periodically to determine curriculum changes and update. This includes the involvement of the students (present and former), advisory committee members, and other personnel.

-- Blocks units of instruction and plans lesson plans based on the competencies of the occupation.

-- Provides appropriate instructional materials, supplies, and equipmment for the students to use.

-- Reviews the instructional materials to assure that they are free from sex bias and sex role stereotyping.

-- Works with an advisory committee.

-- Assists and/or serves as an advisor to the appropriate student organization related to the vocational program area.

-- Plans and arranges an appropriate classroom learning environment. This involves assisting students of different abilities to work at their own pace and in cases where remedial instruction is needed, securing additional help for those students.

-- Reinforces basic skills of reading, communication (written & oral) and computation through vocational education experiences.

-- Helps determine what objective(s) should be established for handicapped students as a part of the individual educational plan (IEP) development.

-- Uses a grading procedure that is made available to all students at the beginning of their training.

-- Sets an example for grooming and dress that is generally found in the occupational area in business or industry to enable students to establish appropriate standards.

Benefits of the Competency-Based Curriculum

Competency-based vocational education offers several benefits to students:

1. The competencies/tasks are directed to the student and provide measurable criteria for determining when the student has acquired the necessary knowledge and skills.

2. Students receive realistic training for the job. They become competent in tasks that are relevant to the occupation.

3. Students know what is expected of them throughout the course. The competencies are made available to them at the onset. They know what they will be doing and how well it must be done.

4. Each student is individually responsible for completing each competency attempted in the curriculum.

5. Students are not compared with other students in their accomplishments because each is expected to work according to his/her individual capabilities and learning style. Because of the various evaluation policies of different school systems, the ideal of not comparing students in determining grades is not always possible. However, the basic thrust of the competency-based program is to evaluate each student according to his/her accomplishment of each task as he/she works up to individual capability.

II
Program Development

Program Development

The format of this handbook was selected to aid administrators and teachers in concentrating on the skills needed for vocational training. It will assist in selecting the array of units and the delivery system which fit the school. This provides the flexibility of varying the course content to include the most valuable skills as appropriate for the scope and sequence. The primary importance is that students are able to secure foundation skills. Schools can vary their delivery systems to maximize student opportunities by:

1. Offering courses on alternate years or other planned sequences

2. Offering two or more courses in the same class

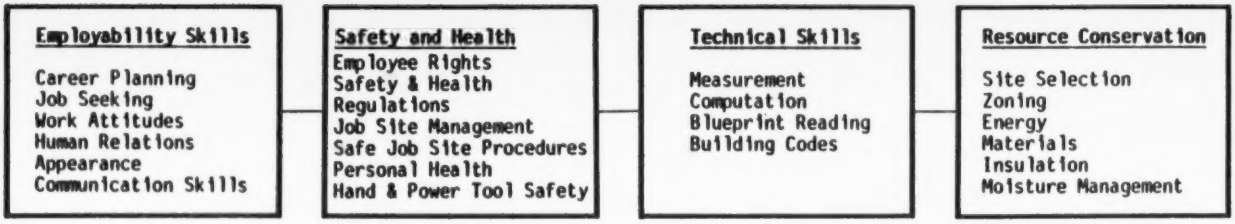
3. Providing individualized materials and instruction

A matrix is included in this guide for use in planning the courses to be offered and the content of each course.

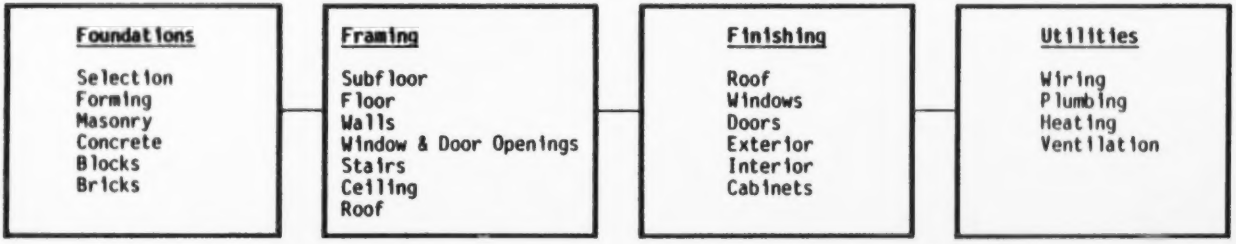
The following chart shows the hierarchy of construction competencies and details specialized competencies for construction education.

Hierarchy of Construction Competencies

Basic Construction Competencies

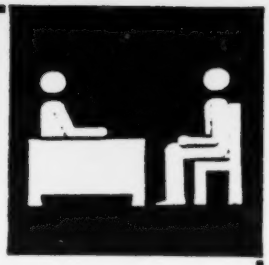


Specialized Construction Competencies



III
Competencies and Tasks

Employability Skills



Competency: Identify the major purposes of carpentry and construction

Tasks: Describe the differences between single-family homes, apartment buildings, and condominiums

Differentiate between residential and commercial construction

Differentiate between residential construction, remodeling, and renovation

Identify the primary construction season in Alaska

Competency: Identify construction careers

Tasks: List the skills most needed by carpenters

Describe qualities typically found in carpenters

Differentiate between union and independents and between residential and commercial building contractors

Identify other potential employers such as lumber yards, companies with residential buildings to maintain and government

Explain the specialties such as former, framer, sheetrocker, and exterior finisher versus jack or jill of all trades

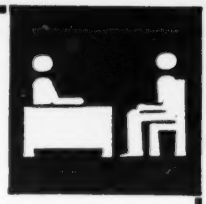
Identify openings and positions

Identify courses, apprenticeships and other experiences which provide required skills

Identify personal traits essential for construction careers

Describe what skills and attributes carpenters need to build houses

Describe what employers look for in applicants



Competency: Identify career choices

Tasks: Conduct a self-assessment:

a. Assess values in relation to work
b. Recognize skills and aptitudes
c. Assess employment history and experience
d. Describe obstacles to employment
e. Use Alaska Career Information System and other career counseling systems and publications

Identify career clusters:

a. Know specific duties and jobs within clusters
b. Describe apprenticeship/training programs

Explain the use of labor market information:

a. Describe the current local labor market
b. Identify occupations which are likely to grow
c. Relate career choices to local labor market

Select career goals:

a. Know how skills could be used in other jobs
b. Plan for career goal
c. Develop specific steps to reach goal

Competency: Prepare a resume and job application

Tasks: Explain the purposes, types, and limitations of resumes and applications

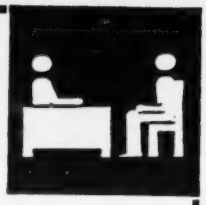
Obtain a social security number

List:

a. Work experience
b. Hobbies and interests
c. Community activities or memberships
d. School activities or memberships
e. Awards, positions or club offices
f. References, including addresses and phone numbers

When filling out applications be sure to:

a. Obtain extra copies, in case of mistakes
b. Read application carefully
c. Follow instructions
d. Complete all items as accurately as possible
e. Write legibly
f. Verify references before using
g. Use NA for items which do not apply to you



Competency: Write a cover letter

Tasks: Explain when and how to write a cover letter

Explain what a writing sample tells a potential employer

List the things the cover letter must say

Competency: Prepare for an interview

Tasks: Explain how to schedule an interview

Demonstrate good phone and conversation manners

Make checklists of the things you need to say and need to learn during the call

List things you need to find out before you hang up (interview date, time, and location, name of interviewers, application, resume, references)

List the elements of a good interivew

List things which typically go awry in interivews

Discuss how to answer the tough questions

Describe the importance of knowing your strengths and weaknesses

Describe the importance of being on time

Describe the importance of appearance (proper dress and grooming)

Describe the importance of body language: proper handshake, posture, eye contact and mannerisms

Explain interview etiquette

Competency: Follow up the interview

Tasks: Analyze the interview

Determine whether a thank-you letter or a follow-up call is appropriate

Explain how to write a thank you note or make a follow-up call

Competency: Be reliable and dependable

Tasks: Maintain acceptable attendance records

Explain importance of being on time

Give timely notice of interruptions to work schedule

Demonstrate reliability

Follow rules of work site or training site

Competency: Maintain good personal relations

Tasks: Use positive attitudes with others

Accept supervision and criticism

Cooperate with others

Accept the chain of command

Competency: Be honest

Tasks: Define honesty and integrity

Explain how to deal with theft and dishonesty

Discuss the relationship between employee integrity and overall company performance

Competency: Demonstrate initiative and productivity

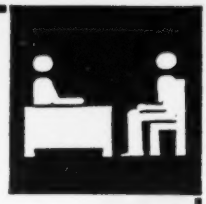
Tasks: Explain importance of:

a. Organizing time effectively
b. Taking responsibility for successfully completing tasks on time
c. Caring about the quality of work

Discuss the value of constructive suggestions

Discuss the importance of timing and approach in making constructive suggestions

Explain how to demonstrate initiative and make suggestions



Competency: Be assertive

Tasks: Differentiate between assertive, aggressive and passive behavior

Discuss whom to go to for employee problems

Describe the importance of setting reasonable goals

Discuss the importance of setting limits in terms of tolerating the behavior of others

Competency: Demonstrate work maturity

Tasks: Describe importance of openness to new situations on the job

Discuss the characteristics of the mature person:

a. Self-acceptance
b. Consideration and respect for others
c. Self-control
d. Positive thinking and attitudes
e. Flexibility

Describe the importance of being flexible

Name ways to develop and maintain good work relationships

Differentiate between personal and job-related problems

Describe the importance of orderly and systematic behavior in a business

Describe how to get along and resolve differences with employers, customers, contractors, suppliers, and building inspectors

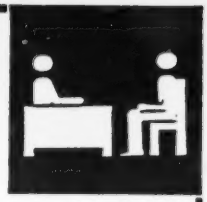
Competency: Use effective leadership skills

Tasks: Describe the Vocational Industrial Clubs of America (VICA) and how it teaches leadership skills:

a. Participate in meetings according to rules of parliamentary procedure
b. Function effectively on committees by accepting assigned responsibilities
c. Plan and conduct effective group leadership activities
d. Participate in society in a democratic way
e. Be punctual and dependable
f. Follow rules, standards and policies
g. Work cooperatively with others

Describe leadership characteristics and responsibilities

Describe membership characteristics and responsibilities



Competency: Solve problems

Tasks: Describe the importance of having a method for analyzing and solving problems

Describe how to identify problems

Discuss the importance of information in problem analysis and resolution

Describe how to analyze problems

Describe how to develop and weigh alternative solutions

Describe how to choose a course of action

Persevere through hardships

Explain how to recognize and change unworkable solutions

Competency: Identify employee rights and responsibilities

Tasks: Discuss state labor laws relating to compensation

Explain the use of tax forms

Explain the minimum wage and types of exempt businesses

Explain employee benefits, rights, and responsibilities

Explain labor contracts, grievance procedures, and the role of unions

Discuss a sample company personnel policy

Competency: Identify personal responsibilities related to employment

Tasks: Secure adequate transportation

List adequate child care alternatives

Inventory independent living skills

Develop personal finance plan

Discuss employer's expectations regarding substance abuse

Competency: Maintain good health for effective job performance

Tasks: Discuss the relationship between regular exercise, proper nutrition and rest, and job performance

Discuss the issue of smoking on the job

Discuss drug abuse as it relates to job performance

Competency: Prevent work-related injuries

Tasks: Describe the importance of safe working attitudes

Describe first-aid and CPR

Discuss the importance of wearing protective gear including: hardhats, eye and ear protection, respirators, gloves, chaps, safety lines, boots, personal flotation devices and survival suits

Describe safety procedures for:

a. chemicals and explosives
b. flammables
c. electricity
d. soddering and weeding
e. heavy equipment
f. hand and power tools
g. ladders and scaffolds
h. construction materials
i. lifting
j. extreme weather conditions
k. noise
m. boats and aircraft
n. wildlife and domestic animals
n. hazardous wastes and carcinogens
o. driving
p. carbon monoxide poisoning from vehicles and space heaters
q. excavations

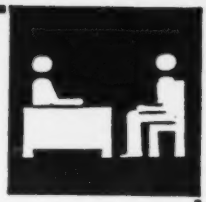
Discuss special safety considerations relevant to each construction activity

Competency: Follow OSHA guidelines

Tasks: Explain the purpose of the Occupational Safety and Health Act

Describe your right under workers-right-to-know and other portions of the Act

Discuss how to resolve hazardous and OSHA violation situations



Competency: Apply reading and writing skills

Tasks: Describe how to find information in trade and consumer magazines and journals

Describe how to write memos, lists, and reports

Describe how to complete forms accurately

Describe how to use supply catalogs to identify and order materials

Describe how to check a shipment against a bill of lading

Describe how to recognize and corrects errors in spelling, grammar, and punctuation

Competency: Follow verbal and written directions

Tasks: Follow directions

Ask for clarification

Explain how to listen

Review situations of poor communications

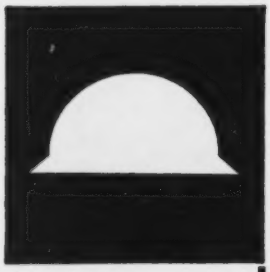
Explain the importance of reading directions when assembling and repairing equipment

Competency: Identify proper job termination procedures

Tasks: Describe how to:

a. Write a letter of termination
b. Give notice verbally
c. Conduct an exit interview
d. Ask for a letter of recommendation
e. Write your own letter of recommendation
f. Fill out paper work required for income tax, social security, unemployment, severance pay, etc

Health and Safety



Competency: Identify the types of health and safety hazards in residential construction

Tasks: List short-term hazards

List long-term health hazards

Differentiate between the hazards of working alone with those of working with a crew

Competency: Identify employee rights related to job hazards

Tasks: Explain the purpose of the Occupational Safety and Health Act (OSHA)

Explain rights under OSHA

Explain why the ultimate responsibility for a worker's health and safety rests with the worker

Discuss how to bring hazardous situations to the attention of coworkers and employers

Explain how to remedy hazardous situations without, if possible, getting fired

Competency: Identify the elements of safe job sites

Tasks: Describe safe working attitudes

List safety equipment which should be on each job site

List and describe the importance of personal protective gear

Competency: Identify the hazards associated with excavations

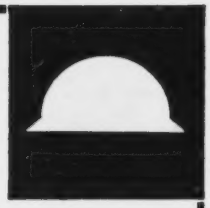
Tasks: Describe why utilities must be located before digging

Explain how to locate buried utilities

Explain the risks of cave-in due to soil collapse

Describe the signs of collapse-prone soils

Learn methods of shoring-up excavations



Discuss strategies for minimizing exposure to soil collapse

Explain the danger of working in excavations while heavy equipment works nearby

Explain safe excavation

Competency: Identify heavy equipment safety procedures

Tasks: Describe the importance of keeping unauthorized personnel out of the worksite

List primary safety concerns associated with the operation of bulldozers, backhoes, lifts, cranes, graders, and other heavy equipment

List primary safety concerns associated with operating and working around large trucks

Differentiate between picks, slings, and spreader bars

Explain hand commands

Describe proper procedures for parking equipment and leaving it unattended

Explain safety procedures when working close to heavy equipment

Competency: Control space heater hazards

Tasks: Explain how space heaters work

Describe the hazards of carbon monoxide poisoning

Describe the symptoms of carbon monoxide poisoning

Describe strategies for assuring adequate ventilation in areas heated by space heaters

Identify emergency exits and escape routes

Develop an escape plan

Continually monitor coworkers for signs of carbon monoxide poisoning

Discuss carbon monoxide warning devices

Explain evacuation procedures

Competency: Prevent fires

Tasks: Describe the fire hazards posed by space heaters

Describe the fire hazards posed by the installation of plumbing

List the fire hazards posed by wiring

Identify the fire hazards posed by smoking (cigarettes, etc.)

Describe the fire hazards posed by adhesives, caulks, paints, varnishes, and certain types of insulation

Explain how to operate fire extinguishers

Explain how to establish fire escape routes

Explain how to install, inspect, and maintain smoke detection and alarm devices

Explain fire prevention/safety procedures

Competency: Control electrical hazards

Tasks: Describe how electricity kills

Identify the reasons why utility lines should be located before digging

Identify the hazards of working near exposed, live wires

Describe the hazards of carrying large objects or using ladders and heavy equipment around live wires

Identify the hazards of using improperly grounded power tools

List the hazards of working in wet weather or with power equipment in poor condition

Describe the purpose and proper use of stud safety plates

Describe electrical safety procedures

Competency: Prevent lung injuries

Tasks: Calculate the volume of air inhaled in each breath, in each minute, in each hour

Describe the hazards of inhaling cement dust

Describe how sawdust and other particulates enter, lodge in, and damage the lung

Describe how volatile materials such as paints, solvents, and plastics can damage the lung

Differentiate between carcinogenic and caustic compounds

Describe asbestos and asbestosis

Explain where asbestos is likely to be encountered and what to do if it is

Describe the importance of:

a. Reading and following manufacturers instructions and warnings and labels
b. Avoiding using aerosols
c. Not using known and suspected carcinogens
d. Wearing respirators

Explain lung safety procedures

Competency: Prevent skin injuries

Tasks: Define terms associated with the skin, its function, and injury

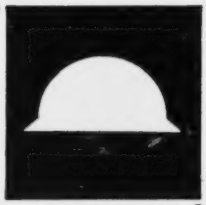
Explain the principles governing the function of the body's largest organ

Identify skin injury mechanisms, agents, and symptoms

Describe the importance of:

a. Reading manufacturer's instructions, warnings, and contents labels
b. Avoiding known or suspected carcinogens and caustic compounds
c. Using insect repellants according to manufacturer's instructions
d. Wearing protective clothing and equipment

Explain safety procedures designed to protect the skin



Competency: Prevent injuries from falls

Tasks: Identify the types of injuries resulting from falls

Describe improper and proper use of scaffolds and ladders

Describe obstacles, situations, and personal habits leading to tripping and falling, and list ways to prevent falls

Discuss the importance of:

a. Marking and barricading openings and other areas which present falling hazards

b. Explain safety procedures designed to prevent falls

Competency: Prevent injuries from falling objects

Tasks: Identify objects and materials likely to fall on workers

Describe head injuries and how they can be prevented or minimized by hardhats

Discuss the importance of:

a. Preventing tools and materials from falling
b. Minimizing overhead hazards
c. Wearing hardhats
d. Following safety procedures

Competency: Prevent eye injuries

Tasks: Describe how eyes are injured

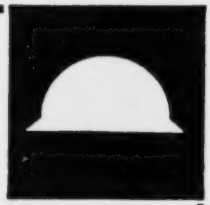
Identify situations demanding the use of safety glasses or goggles

Identify hazards to the eyes posed by volatile chemicals

Identify hazards to the eyes posed by intense lights, such as torches

Discuss the importance of:

a. Locating and operating eyewash stations
b. Reading manufacturers' labels, warnings, contents, and instructions
c. Wearing eye protection
d. Following eye safety procedures



Competency: Prevent hearing damage

Tasks: Explain the ear and how it works

Explain the decibel system

Explain how decibel levels and length of exposure combine to damage hearing

Describe the long-term, cumulative effects of noise on hearing

Describe the contribution of noise to fatigue and accidents

Describe situations requiring ear protection

Describe ear protection devices and their proper use

Discuss the importance of wearing ear protectors

Competency: Prevent lifting injuries

Tasks: Describe hernias and slipped disks

Identify proper methods of lifting and moving heavy and over-size objects

Explain the importance of lifting properly

Competency: Wear safe work clothing

Tasks: Describe the purpose of work clothing

List the attributes of safe clothing

Explain clothing's role in protecting the body from weather extremes and from work hazards such as power tools and obstacles

Explain the importance of wearing proper work and protective clothing

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Competency: Prevent cold weather injuries

Tasks: Explain how cold causes injuries

List the personal habits which contribute to susceptibility to cold injuries

Explain the importance of proper clothing in preventing frostbite and other cold weather injuries

List the working conditions which contribute to susceptibility to cold injuries

Explain the significance of wind chill

List the symptoms and treatment of frostbite

List conditions which produce hypothermia

Explain how to recognize and treat hypothermia

Differentiate between immersion hypothermia and the exposure which results from long-term exposure to extremely low temperatures

Explain how to prevent frostbite and other cold injuries

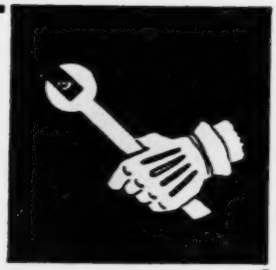
Explain the importance of:

a. Carrying and using cold/hypothermia weather survival gear appropriate to the locale and season

b. Preparing for unexpected exposure due to such events as mis-communication, weather changes, power-outage, fire, vehicle and boating accidents and breakdowns, and emergency landings

c. Living life/workstyles that minimize the potential for cold weather injuries

Hand Tool Safety



Competency: **Use and care for hand tools appropriately**

Tasks: Describe general procedures for maintaining tools

Explain the importance of using the right tool for the job

Explain the importance of keeping tools sharp and in good working condition

Describe proper handling, transporting, and stowing techniques

Explain the proper use and care of:

a. Layout and Measuring Tools:
Squares, rules, tapes, scribes, dividers, chalk lines, levels, plumb bobs, calculators, and transits

b. Boring Tools:
Drills, bits, braces, and augers

c. Pounding, Impelling, and Extracting Tools:
Hammers, hatchets, mauls, mallets, nail sets and pullers, screwdrivers, wrenches, pliers, and wrecking bars

d. Sawing Tools:
Rip, crosscut, miter, compass, coping and hacksaws

e. Knives and Edge Tools:
Chisels, bolt cutters, planes, adzes, and draw, utility, linoleum, and putty knives

f. Holding and Supporting Tools:
Clamps, vices, braces, come-alongs, jacks, ladders, scaffolds, sawhorses, and stilts

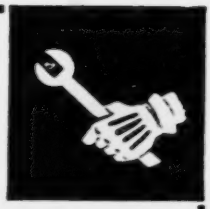
g. Abrading and Scraping Tools:
Rasps, files, sanding blocks, scrapers, and wire brushes

h. Painting and Finishing Tools:
Brushes, rollers, buckets, and trays

i. Drywall Tools

j. Cement and Masonry Tools:
Trowls, hoes, troughs, and buckets

k. Sheet Metal Tools:
Snips and straight edges



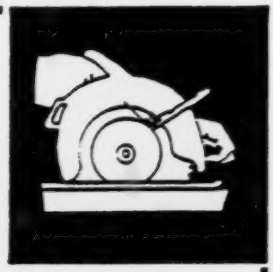
l. Electrical Tools:
Pliers, screwdrivers, wire cutters, and strippers

m. Plumbing Tools:
Torches, wrenches, and threaders

n. Excavating Tools:
Shovels, picks, mattox, pulaskis, posthole diggers, dirt augers, and prybars

o. Maintenance, Cleaning, and Other Related Tools:
Brooms, dust pans, wire brushes, buckets, and sponges

Power Tool Safety



Competency: Use and care for power tools properly

Tasks: List general safety rules for using power tools

Match tasks with the appropriate tools

Identify common power tools used by carpenters and demonstrate their safe use

Distinguish between portable and stationary power tools and know the general safety concerns associated with both types

Distinguish between electric and pneumatic tools and list the general safety concerns associated with both types

Identify special safety equipment required by each tool, such as ear protection, goggles, chaps, gloves, and respirators

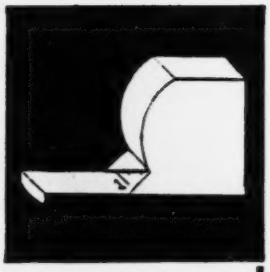
Identify the working parts, define the terms associated with the use, and demonstrate the proper use and care of the following portable power tools:

a. Portable power drills
b. Portable circular saws
c. Portable saber and bayonet saws
d. Portable sanders
e. Portable routers and planes
f. Pneumatic tools
g. Power driven fasteners
h. Power miter and panel saws
i. Portable generators
k. Portable compressors
l. Airless painters
m. Chainsaws

Identify the working parts, know the terms associated with the use, and demonstrate proper use and care of the following shop equipment and machines

a. Table saws
b. Radial arm saws
c. Band saws
d. Edge jointer
e. Thickness planer
f. Uni-plane
g. Shaper
h. Belt and disc sanders
i. Drill presses
j. Grinders and Abraders

Measurement and Mathematics



Competency: Explain the importance of math and measurement

Tasks: Explain the importance of accuracy in calculations and measurements for construction

Describe the variety of measurements that must be done to build a house

List the tools typically used for measurement and calculation

Competency: Use and care for measuring tools properly

Tasks: Explain proper use and care of measuring tools such as bench rules, steel tapes, and framing and combination squares

Demonstrate proper use and care of hand calculators

Competency: Calculate using fractions

Tasks: Manipulate whole numbers

Define graduations, using variously calibrated rules and tapes

Manipulate halves, quarters, eighths, sixteenths, and thirty-seconds

Show how to add and subtract fractions having different denominators

Competency: Draw and measure various geometric figures

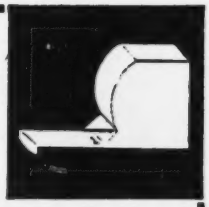
Tasks: Explain formulas and their importance to carpentry

Define squares and rectangles

Lay out squares, rectangles, and triangles

Calculate their dimensions and areas

Explain slope and its significance to carpentry



Calculate slopes

Explain ratios and their significance

Calculate ratios

Illustrate the significance of 3-4-5 triangles

Layout 3-4-5 triangles and their variants

Describe the relationship between the radius, diameter, and circumference of circles

Draw a circle and calculate its area

Read graphs

Calculate percentages and explain their significance

Calculate board feet

Calculate linear feet

Make an end to end center measurement

Strike a straight line on a level surface using a chalk line

Make a center to center measurement

Make a center to center measurement overall

Make a stud face to stud face measurement

Grade a length of pipe with a level

Check squareness using diagonal measurements

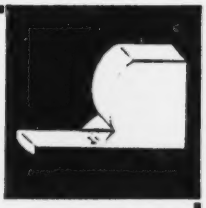
Layout a line at a 90-degree angle from a chalk line using several different methods

Layout a 45-degree angle using several different methods

Measure using the plumb bob and rule

Measure for fitting allowance when installing pipes

Make a throat to throat measurement



Layout a line at a 45-degree angle from a chalk line using a folding rule

Calculate the travel of a 45 degree offset

Set up a tripod and transit level for use

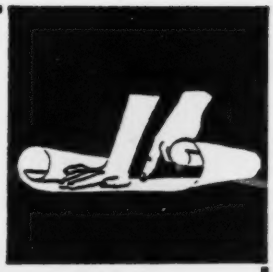
Use a tripod and transit level for laying out angles and levels

Level using a hose or hydro level

Understand the basics of the metric system

Calculate wages and deductions

Blueprint Reading



Competency: Identify uses of plot plans, blueprints, specifications, and building codes

Tasks: Explain the purpose of plot plans, blueprints, specifications, and building codes

Explain the importance of the information in these documents

Competency: Use a plot plan

Tasks: Explain the significance of set-backs, rights-of-way, and easements

Distinguish between front, side, and rear property lines

Identify the actual dwelling and determine its dimensions

Describe how to locate benchmarks, monuments, and corners

Competency: Use the alphabet of lines

Tasks: Describe the meaning and significance of:

a. Object lines
b. Dimension lines
c. Extension lines
d. Hidden lines
e. Center lines
f. Cutting planes
g. Break-line short
h. Break-line long
i. Leaders
j. Section lining

Competency: Use floor plan symbols

Tasks: Distinguish between rough and finished wood

Distinguish between brick, firebrick, concrete, concrete blocks, sand plaster, cement, and tile

Identify outside, inside, and double-acting doors

Describe cinder, earth, gravel, and sand fill symbols

Identify iron and structural steel

Differentiate between hollow, terra cotta, and glazed tile and brick veneer

Explain the symbols for loose and solid insulation, vapor barriers, flashing, and waterproofing

Describe double-hung, casement and arch-cased windows

Identify floor drain, telephone jack, and cable TV symbols

Competency: Use electrical symbols

Tasks: Explain the difference between service and distribution panels

Differentiate between switch leg indication and low-voltage relays

Describe the different types of outlets

Describe the different types of switches

Competency: Use sectioning symbols

Tasks: Describe the difference between rough and finished lumber and metal

Explain the symbols for earth, concrete, and other types of fill

Competency: Use architects scale

Tasks: Explain the six different calibrations on the three faces of the architects scale

Describe how to use full, half, fourth, and eighth scales

Use the scale to calculate actual dimensions and quantities

Competency: Use door and window schedule symbols

Tasks: Explain door schedules

Explain window schedules

Competency: Use foundation plans

Tasks: Determine foundation type

Identify entrances, vents, crawl holes and spaces

Competency: Use floor plans

Tasks: Explain the difference between internal and external walls

Identify windows, doors, closets, and entrances

Describe the meaning and significance of numbers enclosed in circles and triangles

Competency: Use an elevation plan

Tasks: Distinguish between front, rear, and side elevations

Differentiate between grade, finish floor, ceiling, and ridge levels

Describe how to determine roof pitch and its significance

Competency: Use section-thru-sill and section-thru-cornice

Tasks: Identify the various components of each section and the material from which they are made

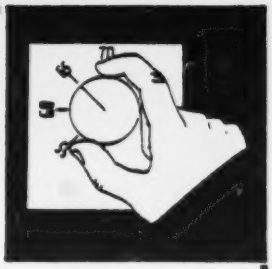
Describe the purpose of each element used, for example the anchor bolt, joists, water table, etc

Competency: Use specifications

Tasks: Explain the significance of specifications

Calculate material quantities given blueprints and specifications

Energy



Competency: Understand energy conservation

Tasks: Explain the first law of thermodynamics (delta E = delta W + delta H), and explain its significance to residential construction

Explain the second law of thermodynamics (the entropy of an isolated system always tends to increase) and its significance to residential construction

Explain why, according to the above laws, it is imperative to insulate all surfaces of the building envelope

Know the health and safety concerns associated with heating and cooling residential structures, paying particular attention to fire and indoor air pollution

Competency: Calculate your structure's energy needs

Tasks: Calculate annual heat loss for buildings in your area

Calculate the heating degree days for your locale

Calculate most energy-efficient building design for your locale

Calculate the most energy efficient building locations and orientations for your locale

Discuss the role of windows in the dynamics of home heating

Calculate the most energy-efficient window systems for your locale

Explain space and water heating options

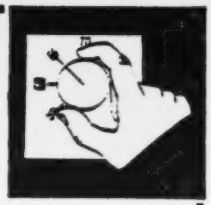
Calculate the most energy efficient space heating system for your locale

Investigate heat pump and air-to-air heat exchanger options

Calculate pay back periods for alternate energy conservation construction techniques

Explain the relationship between dew point and vapor barriers

Calculate the dew point in any insulated wall, ceiling, floor, door, or window



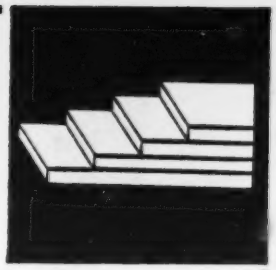
Calculate the cost and pay back of movable insulation on windows

Calculate the efficiency, cost, and pay back of various door systems, including arctic entries

Calculate the efficiency, cost, and pay back of various water heating methods, such as oil, electric, and wood

Explain how to install, maintain, and repair insulation and vapor barriers

Materials



Competency: **Identify the materials commonly used in northern residential construction**

Tasks: Define the terms associated with different types of building materials

List the different types of materials, the forms, dimensions, grades, and quantities, in which they are typically sold

Identify the fire-rating and insulating values of construction materials used in your locale

Competency: **Identify wood growing, milling, curing, grading, and scaling methods**

Tasks: Differentiate between wood defects, such as blemishes, knots, warps, and twists

Explain what kinds of lumber are sold by the board foot and by the linear foot

Show how to calculate board feet using the T X W X L formula

List the grades of construction lumber

Describe the differences between boards, dimension lumber, and timbers

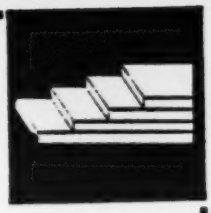
Competency: **Identify the different wood sheet products**

Tasks: Describe different wood sheet products, such as plywood, particle, hard, chip, wafer and compressed

Explain the difference between interior and exterior plywood

Describe how plywood is graded and used

Explain the proper use and care of these wood sheet products



Competency: Identify other building materials

Tasks: Describe the composition, characteristics, common forms, use, care, fire rating, toxicity, and insulation values of:

a. Gypsum
b. Felts
c. Fiberglass
d. Other common insulation materials
e. Vapor barrier materials
f. Fasteners, such as nails, staples, screws, bolts, and anchors
g. Framing hardware, such as joist hangers, Tyvo clips, and nail safety plates
h. Adhesive compounds, such as glues, tars, resins, and caulks
i. Abrasives

Competency: Conserve materials and energy

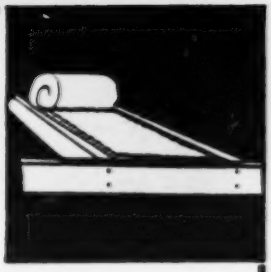
Tasks: Explain how to organize a construction site

Plan construction activities so as to minimize material handling

Explain the importance of:

a. Always moving materials towards job site
b. Ordering so materials will arrive when needed
c. Observing manufacturers instructions and standard safety procedures when moving, storing, or installing materials

Insulation



Competency: **Identify residential insulation systems appropriate for your locale**

Tasks: Explain the principles associated with insulation, vapor barriers, and building envelopes

Define the terms associated with insulation and vapor barriers

Identify the types of insulation and vapor barriers commonly used in Alaska

Explain the significance of conduction, convection, and radiation

Explain the role of doors, windows, and other openings in heating and cooling

Name the places in houses which should be thermally insulated

Explain R-values

Calculate R-value requirements for your locale

Define common insulation forms such as batt, loose sheet, and site-manufactured

Discuss special considerations involved in insulating structures in areas having extremely cold temperatures

Discuss moisture-control issues

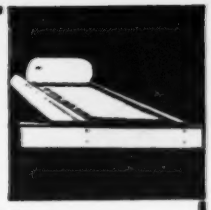
Discuss the super-insulated home and its special insulation, air quality, and moisture management problems

Differentiate between rigid and loose insulation, and blankets and bats

Explain the significance of one-way membranes in controlling air infiltration

Discuss the pros and cons of various types of insulation systems, relative to such factors as cost, ease of installation, fire safety, and toxicity

Calculate pay back periods for various types of insulation systems



Explain why vapor barriers are placed toward the living area side of floor, wall and roof or ceiling systems

Follow standard safety procedures

Follow safety practices specific to working with insulation, such as wearing protective clothing and respirators and minimizing fire hazards

Explain importance of maintaining the integrity of insulation and vapor barriers throughout the construction

Competency: Insulate foundation system for local conditions

Tasks: Explain the principles, terms, and approaches to insulating various types of foundations, such as basements, pilings, pads, treated-timbers, and crawlspaces

Determine insulation style and sequence appropriate to foundation system and construction method

Calculate material quantities

Competency: Insulate floor system

Tasks: Calculate insulation requirements for your structure

Determine insulation thickness and material from blueprints

Calculate material quantities

Rough-in all plumbing and electrical service before installing insulation

Plan, cut, fit, and sequence insulation and vapor barrier installation in accordance with building technique used, northern construction standards, applicable codes, and manufacturer's instructions

Support batt insulation with sheathing or wire mesh

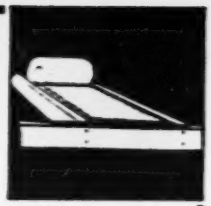
Competency: Insulate exterior wall systems

Tasks: Obtain insulation requirements from blue prints

Calculate material quantities

Plan, cut, fit, and sequence insulation and vapor barrier installation according to manufacturer's instructions, building technique used, northern construction standards, and applicable codes

Explain how to seal all gaps such as those around electrical and plumbing outlets and doors and windows



Competency: Insulate ceiling and/or roof systems

Tasks: Obtain insulation specifications from blueprints

Calculate material quantities

Rough-in electrical and plumbing fixtures before installing insulation

Insulate and seal all electrical and plumbing fixtures and openings, before trimming

Plan, cut, fit, and sequence insulation and vapor barrier installation according to construction technique, manufacturer's instructions, applicable codes, and northern construction standards

Competency: Ventilate the roof cavity system and provide access to the attic

Tasks: Discuss the principles involved with roof system ventilation for moisture control

Discuss access needs for inspection, maintenance, and fire prevention/suppression

Discuss techniques and approaches to attic/roof cavity ventilation appropriate to your structure and locale

Determine attic/roof cavity ventilation specifications/system from the blueprints

Calculate material needs

Plan, cut, fit, and install

Competency: Insulate water and wastewater systems

Tasks: Obtain insulation specifications from blueprints

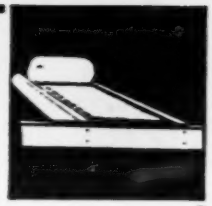
Explain techniques, principles, and terms associated with insulating plumbing systems

Explain the importance and techniques of minimizing exposure of energy and water and wastewater systems to extreme temperatures

Calculate material requirements

Install electrical heat tapes approved for arctic construction

Install fiberglass and preformed styrofoam insulation



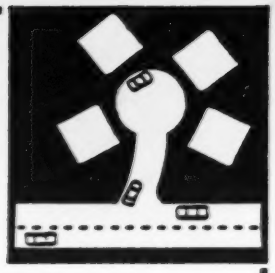
Competency: Maintain integrity of all insulation and vapor barriers

Tasks: Sequence insulation and vapor barriers installation appropriately for construction method

Minimize number of openings in building envelope

Repair damage to insulation and vapor barriers as soon as it occurs

Site Selection



Competency: Identify the legal considerations involved in siting a structure in your locale

Tasks: List and identify different types of zoning in your locale

Describe the importance of and reasons for zoning

Competency: Identify the environmental/safety concerns related to siting

Tasks: Explain how to site structures to take advantage of natural features such as southern exposures and windbreaks

Explain the importance of avoiding low-lying areas prone to fog, flooding, and cold air drainage

List various types of soil in Alaska and the hazards associated with building on them

Describe how to identify frozen ground

Describe construction methods appropriate for permafrost and intermittent permafrost

Describe how to identify and build for high water tables

Identify sites with high-wind hazards

Describe how to site buildings to minimize exposure to wind

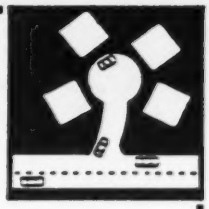
List the hazards of building on or at the base of slopes

Explain how to identify avalanche and slope failure potential, and list siting strategies to minimize hazards

Identify areas and sites with high seismic risks

Describe siting and construction strategies which minimize seismic hazards

Identify flood-plain, storm surge, and tsunami risk zones



Competency: Use a plot plan

Tasks: Define plot plan elements such as easements and set backs

Differentiate between front, side, and rear property lines

Obtain building size (length and width) and orientation (square or diagonal) from plot plan

Identify and protect trees, shrubs, and other natural features shown on plot plan

Competency: Use a transit and leveling rod

Tasks: Explain parts of a level and its uses

Explain the parts of a rod and its uses

Describe the importance and method of caring for transit and rod

Explain leveling procedures

List common measurement errors

Set up transit for use

Establish a benchmark (building elevation reference point)

Locate property corners and other blueprint features using transit and level rods

Orient blueprints using compass

Locate property lines on the ground and establish corners of structure

Define, identify, and locate benchmarks, property lines, and minimum allowable setbacks

Locate sewer, water, electrical, natural gas, phone, and cable TV services

Stake grades and grade lines

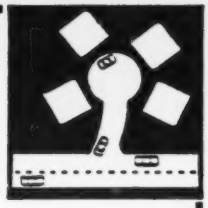
Distinguish between flat, rolling, and sloping terrain

Competency: Square a building

Tasks: Square using the 3-4-5 method

Square using the diagonal method

Know the principles of batter boards and adapt to locate building lines



Competency: Follow building permits and codes

Tasks: Discuss the purposes of building permits and codes

Discuss who is responsible for obtaining and following building permits

Describe what activities require building permits

Describe what building permits allow one to do

Describe how to obtain a building permit

Discuss purpose of building inspections

Discuss procedures for scheduling inspections and complying with inspectors

Discuss using building inspectors as information resources

Foundations and Forming

Competency: Identify the purposes of foundation systems

Tasks: Explain the purpose and importance of foundation systems

Define the terms associated with different types of foundations and their construction

Explain the principles and practices associated with insulating and weatherizing various foundation systems

Follow standard safety practices as well as those specific to foundation construction

Explain how to maintain safe, clean, and orderly worksites

Competency: Identify factors to consider before deciding on foundation type

Tasks: Explain the relationship between soil type, temperature, and water content and the building

Describe how the weight of the house, snowloads, windage, and other factors influence the selection of foundation type and size

Differentiate between pads, slabs, pilings, and footing-type foundations

Determine the most appropriate foundation type for site and locale

Explain the considerations in building gravel pad foundations

Describe how to prepare sites for the construction of a concrete slab

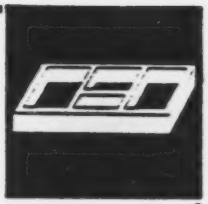
Describe how pilings are located and driven to the appropriate depth

Describe footing type foundation systems

Describe how to construct and install treated wood and truss foundation systems

Describe systems to anchor structures to the various foundations

Identify applicable zoning and building codes



Competency: Construct foundation systems

Tasks: Explain the steps required in building forms

Describe methods of building forms

Define terms used in various types of concrete foundations (piers, piers and beams, square footings, T-footings, monolithic pours, stem walls, and stepped footings)

Calculate material quantities from blueprints and specifications

Layout forms for footings, stem walls, driveways, sidewalks, patios, and steps

Competency: Install insulation, weatherization, and pest and moisture management systems

Tasks: Explain the principles of foundation moisture management

Describe the different insulation strategies required by piling, post and beam, pad and beam, concrete with crawl space, basement, subgrade, and other foundation systems used in your locale

Masonry and Concrete

Competency: Identify the steps involved in pouring concrete foundations

Tasks: Explain concrete chemistry

Explain how concrete is made and how it cures

Explain special considerations when making and curing concrete in extreme climates

Define the terms associated with concrete

List the various steps and special considerations involved in working with a premix delivery truck

List the various steps involved in mixing and using your own concrete

Explain the safety procedures relevant to concrete work

Competency: Prepare site subsurface and forms

Tasks: Describe the steps involved in preparing site subsurface, including grading, excavation, piers, insulation, geotextiles, reinforcement, hardware, or other special considerations

Competency: Compute the volume of concrete required

Tasks: Calculate the number of cubic yards with standard formula (L x W x H + percentage for wasteage)

Select rock material from exacavation to reduce the volume of concrete required

Explain importance of having sheathing/forms flush with ground to minimize waste of concrete

Determine the appropriate mixture for sites not accessible to premix trucks

Calculate number of sacks of sand and cement and gravel

Calculate other material needs, such as rebar, from blueprints

Competency: Use and maintain concrete tools and equipment properly

Tasks: Identify concrete tools such as shovels, hoes, trowls, buckets, and wheelbarrows

Determine the number of tools required for the pour

Explain the importance of cleaning tools and equipment immediately after use

Competency: Plan a concrete pour

Tasks: Explain the importance of preparation and the necessity of working fast

Erect ramps and scaffolding as required

Schedule sufficient personnel, equipment, and tools to mix, cart, place, and tamp concrete

Locate mixing/delivery site to maximize downhill hauling and minimize the distance and total amount of hauling

Identify and install concrete joints where appropriate

Install building anchor bolts as appropriate

Explain safety procedures relevant to working with heavy equipment, using scaffolding and ramps, and working with caustic compounds

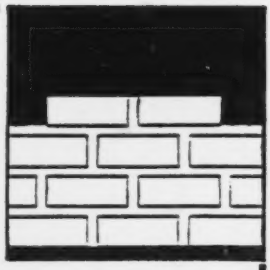
a. Wear protective clothing and equipment
b. Maintain clean and orderly worksite
c. Hoist and lift appropriately

Competency: Finish concrete

Tasks: Maintain proper curing temperature and humidity

Treat and finish surfaces

Blocks and Bricks



Competency: Organize job site

Tasks: Explain how to prepare foundation or base

Protect materials, particularly cement, from moisture

Determine most appropriate building material (bricks, blocks, mortar, or rocks)

Calculate material quantities

Layout building materials to save time and effort

Competency: Lay and mortar blocks

Tasks: Describe masonry problems common to your locale, and their recognition and prevention

Mix mortar to appropriate consistency

Lay blocks and bricks using a line and level

Offset blocks and bricks to maximize strength

Cut and trim materials

Wash masonry walls

Point and caulk walls

Describe the use of fastening devices

Build block corners and lay block pilasters

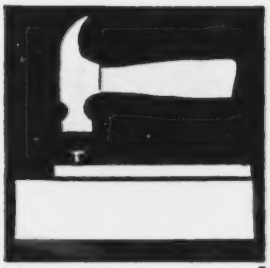
Build block leads

Competency: Identify other masonry skills

Tasks: Explain how to:

a. Lay glazed tile
b. Build brick corners and leads
c. Lay SCR brick
d. Construct single and double fireplaces
e. Lay flagstone
f. Build block piers
g. Design and layout stone patterns

Framing: Subfloor/Floor



Competency: Identify energy-efficient framing systems for your locale

Tasks: Define the terms associated with framing systems

Explain the principles of framing

Explain the difference between western, balloon, and post and beam framing

Compare various framing systems for their strength, cost, and energy efficiency

Calculate and compare the payback periods of various energy-efficient framing systems

Describe safety procedures relevant to framing, such as proper carrying and storing of materials and proper bracing and supporting of structures

Identify applicable building codes

Competency: Frame and insulate various floor systems

Tasks: Define the terms associated with framing and insulating floor systems

Explain the principles of floor framing

Determine floor-framing system from blueprints

Calculate material quantities

Determine systems (framing, insulation, and moisture and noise management) installation sequence appropriate for floor system

Competency: Install a floor support system

Tasks: Define the terms associated with various floor support systems such as glue-lam beams, girders, trusses, or posts

Explain the principles associated with floor support systems

Determine floor support system-type from blueprints

Calculate material requirements

Plan and sequence insulation and moisture management systems installation as appropriate

Competency: Frame a sill

Tasks: Define the terms associated with sill framing

Explain the importance of sill seals and insulation

Calculate material requirements

Install sill seals and insulation appropriate to structure and locale

Anchor the sill plate to the foundation using bolts

Competency: Construct energy-efficient floor systems

Tasks: Compare TJI, solid wood, truss, and joist systems

Determine the framing type from the blueprints

Determine the spacing of the centers

Calculate materials, include an extra joist for each end and partition wall

Explain how to allow for utilities

Measure out the joist positions on sill and mark

Install rim or band joist and square

Install joists, joist bridging, and blocking

Frame openings in floor for stairwells, stoveflues, chimneys, and other utility exits

Competency: Install sub-floor

Tasks: Explain types of sub-floor

Determine from blueprints whether the sub-floor is to be plywood or 1" lumber

Calculate material requirements (factor for waste)

Determine fastening system appropriate to materials and construction methods

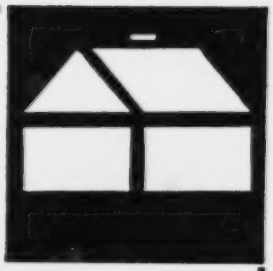
Install joist fastening and connecting systems, such as hangers, according to blueprints

Rough in all sub-floor plumbing, heating, and electrical systems, before installing sub-floor

Splice on joists

Drill holes for pipe

Framing: Walls



Competency: Identify the principles of energy-efficient wall construction for northern locales

Tasks: Define the terms associated with walls and their construction

From the blueprints, floor plans and elevations, differentiate between interior and exterior and load and non-load bearing walls

Determine the sequence of wall construction

Implement state-of-the-art insulation, energy conservation, and moisture management techniques

Calculate materials

Explain safety practices relevant to wall construction

Competency: Layout exterior walls

Tasks: Obtain wall locations from elevations and floor plans

Layout the first wall according to the following sequence:

a. Snap a chalk line the width of the sole plate from the outside edge of the box sill or from the outside of the floor
b. Fit top and sole plates
c. Locate joints appropriately
d. Locate the center of intersecting partitions and openings along edge of floor
e. Mark the location of intersecting walls, openings, and studs on plates
f. Locate partition intersections so as to maximize wall energy-efficiency
g. Repeat sequence for the other walls

Determine partition wall measurements and dimensions from the blueprints and lay them out

Competency: Construct exterior walls

Tasks: Define terms associated with framing walls

Calculate materials

Separate wall plates

Nail studs in place, allowing for openings, and extra studs for partition walls

Rough in door and window openings with trimmer and cripple studs, rough sill, and header

Assemble and install partitions and corner posts

Align and square wall frame

Insulate cavities which will become inaccessible

Erect walls and brace temporarily as appropriate

Competency: Install different types of wall sheathing

Tasks: Explain wall sheathing terms and principles

Explain the characteristics, such as insulation, flammability, and strength of different sheathing types

Determine sheathing type from blueprints

Install for energy conservation and moisture management concerns, using appropriate fastening systems for material and locale

Erect walls and brace temporarily

Nail double top plate on all exterior walls

Competency: Rough-in window and door openings

Tasks: Define terms and explain principles associated with roughing-in openings

Determine header type and dimensions from blueprints

Measure, cut, and install headers using appropriate spacers

Measure, cut, and install trimmer and cripple studs

Competency: Construct interior walls

Tasks: Layout partition sole plate according to blueprints, making sure to differentiate between bearing and non-bearing walls

Chalk lines on floor

Layout partition top plate

Mark locations of intersections and openings

Separate wall plates

Measure and mark for stud locations

Fit top and sole plates, locating joints appropriately

Nail studs in place, allowing extra studs for intersections

Rough in openings with headers and trimmers

Erect, square with floor plan, and nail in place

Install backing and blocking at partition "T" (the partition/exterior wall intersection) allowing for special concerns such as energy management, plumbing, wiring, and backing for cabinetry and other furnishings

Competency: Identify the principles of stair construction

Tasks: List and define the terms associated with stairs and their construction

Identify the parts of a staircase

Differentiate between open, semi-housed, housed, L-shaped, winder, and straight stairs

Identify rise, run, width, and head room minimums and other standards

Define other terms related to stairs

Describe safety practices relevant to stair construction

Identify applicable building codes, paying special attention to those designed for occupant safety

Competency: Construct stairs according to building plans

Tasks: Calculate total rise of the stair in inches

Calculate total run of the stair in inches

Calculate the stringer length using the formula (diagonal between total run and total rise = stringer length, but add two feet for waste)

Calculate unit rise (should be between seven and eight inches)

Calculate unit run (Should be between nine and eleven inches)

Explain why all risers must be same size and all treads must be same size

Calculate number of risers and treads

Competency: Layout stringer

Tasks: Mark unit run on blade of framing square and rise on tongue, using the formula (the diagonal between these two marks equals the stringer length per unit run)

Using the rise and run marks on the framing square, lay out tread and riser locations

Lay off bottom end cut as if for last riser

Shorten the lowest unit rise by the tread thickness (the step from the floor should be the same height as all the other steps)

Explain how to cut with appropriate tools

Cut risers and treads

Competency: Assemble the stairs

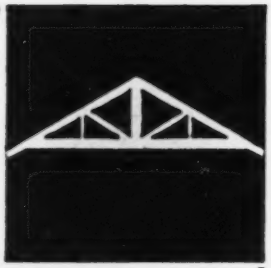
Tasks: Nail stringers to side wall

Nail all the risers in place

Level and nail treads in place

Measure, cut, and install the baluster rails

Framing: Roofing



Competency: Identify the principles of energy-efficient cold-region roof framing

Tasks: Define the terms associated with roofs and their construction

Differentiate between various roofing styles, such as flat, gable, gambrel, hip, mansard, and shed roofs

Explain concepts, principles, and considerations associated with roofing, such as snow loading and pitch

Distinguish between various types of roof truss systems, such as the Fink, or W, and Howe trusses

Describe the Arkansas and other energy-efficient roof construction systems

Describe safety procedures relevant to roofing, such as preventing falling objects and workers

Identify applicable building codes

Competency: Install ceiling systems

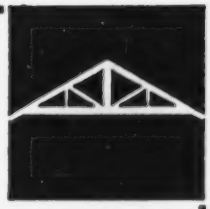
Tasks: Define the terms associated with framing ceilings

Explain the principles and considerations associated with constructing various types of ceilings

Calculate materials from blueprints and specifications

Layout, cut, and install ceiling joists in the following sequence:

a. Measure and lay off joist locations on double plate
b. Layout the outside of the first joist flush with the double plate's inside corner
c. Starting from the inside edge of the end double plate, measure and mark the double plate every 16 inches
d. X the far side of the mark to show where the joists should be nailed
e. Repeat steps for the opposite wall



Competency: Construct hip-type roof

Tasks: Explain how to construct hip-type roof

Layout and construct in the following sequence:

a. Cut joist ends to match roof pitch
b. Position joists on plates as marked
c. If necessary to splice joists, make sure the splice is on a bearing wall
d. Use butt splice with a scab or lap
e. Toe nail to plate

Competency: Lay off rafter locations

Tasks: Define unit rise, unit run, and unit span

Determine roof slopes from blueprints

Calculate rafter lengths using several methods such as framing square, rafter tails, pythagorean theorem, and full-length rafter tables

Explain importance for ridge boards being next dimension wider than rafter

Cut ridge board to correct length (if barge rafter used at each end, make allowance)

Mark ridge board and top plate

Mark location of rafters on wall plates and ridge board according to blueprints

Competency: Calculate rafter lengths

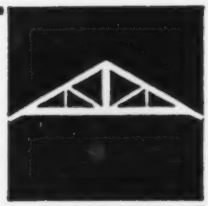
Tasks: Calculate using the following methods:

a. Pythagorean theorem
b. Framing square step-off
c. Formula: (rafter length = line length + overhang length - one-half the thickness of the ridge board
d. Rafter tables from framing squares for common rafters

Competency: Cut and install rafters

Tasks: Explain the importance of using a rafter pattern

Explain the importance of making an accurate pattern



Layout and cut a common rafter pattern using the formula: (Common rafter length = line length + overhang - 1/2 the thickness of the ridge board)

Use pattern to cut remaining common rafters

Layout and cut hip, valley, jack, and barge rafter patterns and install

Make sure rafter boards are sufficiently long for rafter span plus overhang

Place rafter board across two saw horses

Use framing square to determine and mark ridge or crown cut angle first (This cut must be plumb when rafter is nailed in place)

Competency: Cut birdsmouth or seat

Tasks: Mark plumbcut, then seatcut, and square or tail cut last, using appropriate tools

Competency: Identify the principles of truss construction

Tasks: Define the terms associated with different truss systems

Explain truss design and construction engineering specifications and legal requirements

Explain state-of-the-art techniques for energy and moisture management

Competency: Construct a truss

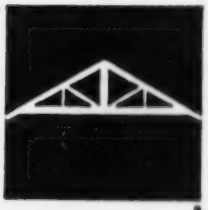
Tasks: Differentiate between manufactured and site-constructed trusses

Determine truss specifications from blueprints

Calculate number of trusses and quantities of materials

Construct gable trusses using a jig

Construct regular house trusses using a jig



Competency: Set, align, and brace truss

Tasks: Align and temporarily brace exterior walls, using a string line

Stack trusses on top of wall

Set, square, plumb, and brace gable and regular house trusses

Install barge rafter

Competency: Complete other roof features

Tasks: Install bracing according to blueprints and local building codes

Construct cornice frame (see Exterior Finish Unit for cornice trim)

Construct gable walls

Install air ventillation system framework, paying particular attention to access and air and moisture management concerns for locale

Competency: Sheath roof

Tasks: Define terms associated with roof sheathing

Explain principles and considerations associated with sheathing roofs

Check blueprints for sheathing specifications

Calculate material quantities

Tack sheathing in place:

a. Sheathing should be flush with the face of the false facia and the barge rafter
b. Splice on rafters
c. Stagger splices for strength
d. Leave ridge sheathing for last
e. Snap a chalk line to mark the center of each rafter
f. Fasten according to manufacturers' instructions, blueprints, and applicable codes
g. Sheath to center of ridge from each side of roof

Roof Finishing

Competency: Identify energy-efficient roofing systems appropriate to your structure

Tasks: Identify the components associated with various types of roofing systems, such as shake, metal, asphalt, and shingle

Describe the insulation value, flammability, useful life, and other characteristics of these common roofing systems

Define terms associated with roofing styles, elements, and materials

Determine local strength requirements for wind, water, and snow-loading

List the principles and considerations associated with finishing roofs

Determine the ideal roofing system for your locale and structure

Obtain roofing specifications and calculate area from plans

Calculate roof material quantities, such as felt, insulation, shingles, flashing, drip edge, fasteners, and adhesives and sealants

Describe relevant safety procedures, such as ladder and scaffold installation and use and material management

Identify applicable building codes

Competency: Apply roofing

Tasks: Erect scaffolding and ladders

Follow manufacturer's directions, building codes, and specifications

Apply and fasten felt

Measure, cut, and sequence insulation and vapor barrier installation as required

Layout, fasten, finish, and cap roofing material

Install metal drip edge:

a. Starting at one end of facia board, work way around structure
b. Overlap one inch, when joining sections of drip edge
c. Nail every eight inches

Install flashing in valleys and around chimneys and saddles:

a. Start at bottom and work towards ridge
b. Flashing must extend at least four inches to either side of valley
c. Overlaps between pieces of flashing should be three inches
d. Counter-flashing on chimneys must have at least a four inch rise
e. Where roofs abut walls, flashing should extend a minimum of three inches under wall sheathing, four inches under roof shingles

Install and fasten standard wood shingles:

a. End shingles should extend 3/4" beyond rake and eaves
b. First layer should be flush with drip edge
c. Leave one quarter to one half inch space between each shingle
d. Nail each shingle 3/4" from edge, six and one half inches from butt or lower end
e. Drive nail only until head is flush with shingle surface
f. Use a double layer of shingles on first row

Install metal roofing

Install and fasten shakes:

a. Extend starter shakes 3/4" beyond rake or eave edge
b. Leave 1/4" to 1/3" gap betrween each shake
c. Nail shakes 3/4" from each edge, 11.5 inches above the butt end
d. Double the first row
e. The bottom of the second and all subsequent rows should be 10 inches above the previous row
f. A chalk line will help keep the shingles straight
g. Offset joints at least two inches from one row to the next
h. Joints should not be directly above one another for at least three rows

Install and fasten asphalt shingles:

a. Extend first shingle of each row 3/4" beyond rake and eaves
b. Install first row upside down (tabs up)
c. Start first course with full strip
d. Follow manufacturer's exposure recommendations
e. Start the second course tabs down, using full strip minus half a tab
f. Begin the third row with a strip minus a full tab
g. Use a chalk line for keeping courses linear

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Shingle along flashing:

a. Expose 4" of flashing at the top of valleys
b. Expose all but 2" of flashing at valley base
c. Snap chalk line on flashing for a guide
d. Be careful not to puncture flashing in valley
e. Custom cut shingles
f. Where roofs abut walls, shingle up to wall edge

Shingle roof hips and ridges:

a. Shingle up to crown on both sides
b. To shingle hips, start at bottom and work up
c. With asphalt roofs, use a single tab
d. Double the bottom shingle
e. Nail one inch in from the edge on both sides and six inches up from the bottom
f. Leave five inches exposed
g. With wood shingle and shake roofs, choose shingles of the same size
h. Nail shingles in pairs, one on each side or ridge, but overlap right side and left side alternately,
i. With asphalt shingle roofs, start at the hip bottom or one end of the ridge, and shingle to the opposite end, leaving five inches of shingle exposed

Plumbing and Heating

Competency: Identify plumbing systems

Tasks: Define the terms associated with plumbing systems

Identify the purposes of water and wastewater systems

Explain the physics of plumbing and plumbing principles, concepts, and considerations

Sketch isometric drawings of water and wastewater systems for a two-story house

Identify the various types of plastic pipe and their uses

Describe relevant safety practices, such as insuring adequate ventilation when working with volatile and toxic compounds and taking extra precautions to prevent fires when working with torches

Identify all applicable building and plumbing codes

Competency: Install plastic water and wastewater pipes

Tasks: Determine pipe specifications from blueprints

Calculate material quantities

Explain the uses and limitations of various types of plastic pipes and fittings

Explain correct use of plumbing tools and materials such as saws, vices, and files

Follow manufacturer's instructions and observe applicable building codes

Prepare plastic pipe joints

Assemble and solvent-weld plastic pipe

Cut, fit, hang, and pressure test as necessary

Competency: Install copper pipe and tubing

Tasks: Define the terms associated with copper pipes and their installation

Explain the principles associated with copper tubing

Discuss various types of copper fittings and their use

Describe relevant safety procedures, such as proper use of torches, saws, and solder

Prepare copper pipe and fittings

Flare copper tube using yoke and screw-type flaring tool

Assemble a torch kit

Complete a joint using compression fittings

Sweat-solder a joint

Cut, fit, hang, and pressure-test system

Competency: Install water supply and wastewater systems

Tasks: Make an isometric drawing of the water supply system for a two-bathroom house

Install building water and wastewater systems, including vents and stacks

Test systems

Rough-in, install, trim, and test fixtures, such as sinks, tubs, showers, toilets, garbage disposals, washing machines, and dishwashers

Competency: Insulate and/or bury pipe for your locale

Tasks: Discuss local pipe insulation strategies

Explain use of slip-lining and other low cost, state-of-the-art methods to protect pipes from freezing

Compare the pros and cons of the various piping insulation stategies available

Identify heat tapes and passive insulation appropriate for burial

Describe relevant safety procedures, such as those governing heavy equipment operation, cave-in, and electrical hazards

Explain how to back-fill without damaging pipe

Competency: Install heaters and heat exchange systems

Tasks: Define the terms associated with systems such as heat pumps, air-to air heat exchangers, boilers, furnaces, and radiators

Explain the principles associated with these systems

Compare alternative heating systems, such as space heaters, monitors, and solar heating

Calculate costs, benefits, and pay-back periods of various systems for your structure and locale

Determine the optimal heating and ventilation systems for your structure and locale

Obtain specifications from blueprints

Calculate combustion air supply needs and install appropriate system

Follow standard safety procedures and those specific to working with torches and electricity

Install appropriate fire prevention/defense systems

Maintain clearances specified by manufacturers' instructions and applicable building codes

Install warmed/forced-air, hydronic or baseboard, and radiant systems such as wood stoves

Competency: Install air and moisture management systems

Tasks: Define the terms associated with air and moisture control systems

Explain the principles associated with these systems

Calculate ventilation requirements for your structure and locale

Compare various systems

Obtain systems specifications from building plans

Calculate costs, benefits, and payback periods of various systems

Select and plan installation of system, minimizing penetrations through building floor and roof in particular, and building envelope in general

Explain relevant safety procedures

Rough-in, install, and trim air and moisture management systems according to manufacturers' instructions and applicable building codes

Wiring

Competency: Identify residential electrical systems

Tasks: Define terms associated with residential electrical systems

Explain the physics of residential electricity

Explain relevant safety procedures

Competency: Design a residential electrical system

Tasks: Determine electrical requirements from blueprints and specifications

Follow national and local electrical codes

Read and interpret electrical schematics and diagrams

Determine how many convenience and appliance outlets should be on each circuit

Competency: Rough-in electrical system

Tasks: Follow applicable electrical and building codes and safety procedures

Schedule electrical inspections as required

Demonstrate proper use and care of electrical tools and equipment

Prepare, install, and ground electrical service entrance

Install a main electrical panel and breakers

Rough-in feeders, branch circuit cables, and junction boxes

Rough-in outlet and switch and other circuits, such as those for appliances, door chimes, and chandeliers

Rough-in circuits for outlets controlled by multiple switches

Rough-in circuits for thermostat wiring

Install outlet boxes for switches and receptacles

Install switches and receptacles

Joint and splice using various methods and devices, such as crimps and mechanical connectors

Competency: Connect and trim residential electrical system

Tasks: Rough-in armored and non-metallic cable to outlet boxes

Install lighting fixtures

Connect pole switches with and without pilot lights

Install flush mount switches in finished walls

Connect split circuit duplex receptacles

Connect three- and four-wire 220-volt receptacles

Install an appliance pilot light

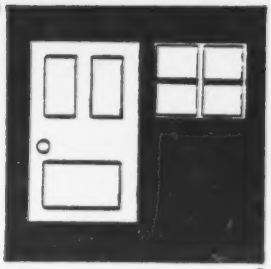
Install ground fault interrupting device

Connect furnace motor

Install and connect baseboard heat units

Install and connect environmental system controls, such as heaters and heat exchangers

Windows and Doors



Competency: Identify energy-efficient window systems and installation strategies

Tasks: Define terms associated with energy-efficient windows and their installation

Explain the principles associated with energy-efficient window systems

Identify types and uses of residential window systems

Compare the energy efficiencies of available glazing and window systems

Explain the latest developments in energy-efficient window construction

Identify applicable building codes when selecting and installing residential window systems

Identify relevant safety practices, such as those for working with glass and caulking compounds

Competency: Install energy-efficient windows

Tasks: Obtain window type from window schedule

Calculate material needs

Explain how to remove window unit from packing

Measure rough opening and compare with window unit

Determine if rough opening is correct size according to blueprint and door schedule

Line the rough opening with appropriate materials to prevent condensation damage and air filtration

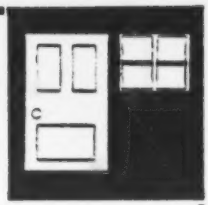
Shim sill until level, ensuring that sides are plumb

Center the window unit in the opening and tack in place

Make sure window opens without binding

Re-check opening for level and plumb

Fasten framing appropriately



Competency: Identify energy-efficient door systems and installation methods

Tasks: Define terms associated with different door styles and systems and their installation

Explain the principles associated with energy-efficient door systems and their installation

List the various types of door systems in commmon use

Differentiate between interior and exterior and site-fitted and pre-hung doors

Compare the energy-efficiency of available door-unit systems

Identify applicable residential code requirements, especially those designed to protect the occupants, such as door size and location

Explain relevant safety practices

Competency: Fit and assemble exterior jamb set

Tasks: Select door and collect jamb materials

Bevel door

Cut matching hinge gains in door and side jambs

Cut jamb and sill sections to correct dimensions, allowing for proper door clearance (and uneven floors)

Assemble jamb set with jamb extensions if necessary

Fit and apply exterior casing such as buck mold

Attach hinges and connect door to jamb

Competency: Install exterior door unit

Tasks: Carefully uncrate door unit

Measure rough opening and compare with door unit size

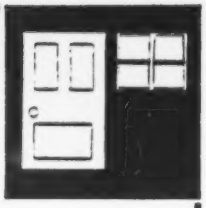
Check rough opening for level and plumb

Line opening with material to prevent moisture damage and air filtration

Place unit in opening, assuring exterior casing fits tight against wall surface

Shim door and fasten, assuring level and plumb installation with proper clearance

Check door for proper swing and closing



Mark glass to prevent breakage through accidental use of window space

Cut off excess shims

Nail exterior casing

Competency: Fit and assemble interior door jamb set

Tasks: Select door and collect jamb materials

Bevel door

Cut matching hinge gains in door and side jambs

Cut jamb, allowing for proper clearance and uneven floors

Assemble jamb set

Attach hinges and connect door to jamb

Competency: Install interior door unit

Tasks: Check the rough opening for size, level, and plumb

Set door unit into opening

Shim and fasten door assembly, assuring level and plumb installation with proper clearance and flush closure

Check for proper swing

Trim excess shim material

Competency: Install locks

Tasks: Obtain lcok type from specifications

Select appropriate lockset and read instructions

Competency: Fit and install interior doorstops

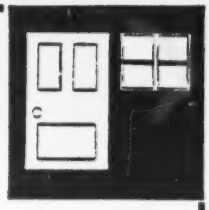
Tasks: Miter ends of head and side stops to fit jamb set

Tack stop into place, flush on lock side, but allowing for hinge-side clearance

Check door unit assembly for proper operation

Adjust stops as necessary

Fasten stop permanently



Competency: Install special operating doors

Tasks: Explain the difference between byfold, multifold, pocket, sliding, and bypass doors

Select appropriate doors according to blueprints

Prepare opening

Check rough opening

Cut, fit, and assemble jamb set to accomodate door

Use spreaders when installing jamb set

Shim and fasten door assembly assuring level and plumb

Exterior Finish

Competency: Identify exterior finish systems

Tasks: Define the terms associated with exterior finish systems

Explain the principles associated with exterior finish systems

Compare the cost and energy effectiveness of exterior finish systems common in your locale

Determine the exterior finish system for your structure from the blueprints

Explain relevant safety practices

Competency: Install cornice trim

Tasks: Cornice trim installation sequence depends on roofing type and styles

Calculate material quantities from blueprints

Erect and use scaffolding and ladders safely

Cut, fit, and install:

a. facia
b. soffit
c. frieze
d. molding
e. shingle stop

Competency: Identify siding options

Tasks: List and define siding types and styles, such as sheet, drop, and clapboard

List and describe siding materials (such as metal, wood, and petroleum-derived synthetics) and their uses

Calculate differences in insulation value of various siding materials

Calculate siding and related material quantities from blueprints

Competency: **Apply siding materials and trim**

Tasks: Erect scaffolding and ladders as needed

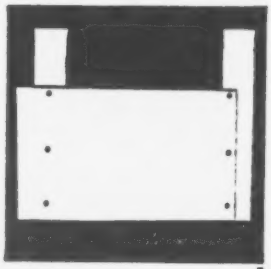
Apply air filtration and moisture management materials such as building felt or TYVEK

Calculate and layout most efficient siding applications procedure according to manufacturer's specifications and such factors as strength, horizontal and vertical spacing, and joint and opening locations

Cut, fit, and apply siding materials and corner trim as needed

Install, cover, and trim attic ventilation

Interior Finish



Competency: Identify ceiling finish systems

Tasks: List and define terms associated with ceilings and ceiling finish methods

Explain principles of ceiling systems and their installation

Compare types of ceiling systems and their uses, and insulation values

Calculate material requirements according to blueprints and specifications

Competency: Install ceiling

Tasks: Ensure that all cavities have been properly insulated and that air and vapor barriers have been installed and their integrity has been maintained

Determine installation sequence and layout optimally according to manufacturer's instructions, building plans, and applicable codes

Assemble special lifting and holding equipment

Cut and fit

Competency: Identify wall finish systems

Tasks: Define the terms associated with wall finish systems and their installation

Explain the principles associated with finishing walls

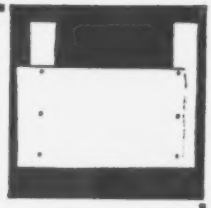
Calculate and compare the energy-efficiency and cost of various wall finish systems

Explain relevant safety procedures

Obtain wall finish system from building plans

Calculate wall finish materials

Competency: Apply wall finish system



Tasks: Ensure that all wall cavities have been properly insulated

Ensure that the integrity of wall insulation and vapor management systems have been maintained

Determine installation sequence

Layout optimally according to manufacturer's instructions and all applicable building codes

Assemble and position special lifting and holding devices

Competency: Identify gypsum board walls and ceilings

Tasks: Define the terms associated with sheetrock and its installation

Explain the physical characteristics, strengths, and weaknesses of gypsum wallboard

Explain the principles of sheetrock construction

Calculate material requirements from blueprints

Assemble special tools, including lifts and jacks

Follow relevant safety practices

Competency: Install gypsum board

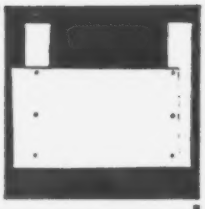
Tasks: Install backing at corners

Plan, layout, cut fit and install:

a. Install long dimension at right angles to joists or studs
b. Fasten according to applicable building codes and manufacturer's specifications

Install metal corners

Competency: Finish and texture gypsum board



Tasks: Mix, cure, and spread joint cement compound according to manufacturer's instructions

Tape joints

Spot nails

Bed Tape

Feather seams

Respot

Sand

Apply texture

Competency: Complete stairs and trim

Tasks: Review stairs construction terms and principles

Determine trim specifications from building plans

Calculate material needs

Cut, fit, and install false stringers

Remove temporary treads

Cut, fit, and install risers and treads

Fasten with adhesives, screws, and other approved methods

Install baluster rails according to building plans

Trim out staircase according to building plans

Competency: Identify different types of flooring

Tasks: Define the terms associated with various types of flooring systems

Explain the principles of flooring systems

Obtain flooring specifications from building plans

Calculate material requirements

Competency: Install underlayment

Tasks: Determine underlayment specifications from building plans

Select materials

Calculate material requirements

Cut, laydown, and install felt, air/vapor barrriers, and/or construction adhesive

Layout, cut, fit, and install optimally, according to subfloor, applicable building codes, and manufacturer's instructions

Competency: Lay a hardwood strip floor

Tasks: Define terms and describe principles associated with hardwood floors and their installation

Laydown underlayment, according to building plans

Calculate hardwood material requirements

Plan, layout, cut, fit, and install:

a. Overlap joints four inches
b. Begin in central area and work toward exterior walls
c. Lay flooring at right angles to joists
d. Make sure first strip is straight (square with building walls)
e. Snug each subsequent strip before nailing
f. Use scrap from end of one row to begin next
g. Cut the last strip to fit
h. Leave a 1/2" gap for molding

Competency: Lay a resilient tile floor

Tasks: Define terms associated with resilient tile floors and their installation

Explain the principles associated with tile floors and their installation

Clean sub-floor

Make sure sub-floors are smooth and level

Fill any unfilled joints

Plan and layout according to materials selected, manufacturer's specifications, building plans, and applicable codes

Snap a chalk line across each room from endwall to endwall

Spread adhesive according to manufacturer's instructions, using proper trowel

Lay tile, trimming border, if necessary

Eliminate all air pockets with flooring roller

Competency: Install paneling

Tasks: Define terms related to paneling

Explain the principles and materials associated with paneling and its installation

Determine from blueprints whether paneling is to be attached directly to studs or sheet rock or to furring strips

Calculate materials

Stand sheets on end

Plan, layout, cut, fit, and install for optimal material use and aesthetics:

a. Work your way around room
b. Fasten according to manufacturer's instructions, building specifications, and applicable building codes
c. Make all joints on stud
d. Panel edges should coincide with window and door openings whenever possible

Locate and cut receptacle and switch holes accurately

Competency: Install carpeting

Tasks: Define the terms associated with carpets and their installation

Explain carpet installation principles

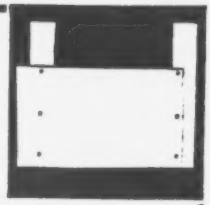
Demonstrate the proper use of carpeting tools

Obtain carpeting specifications from building plans

Calculate carpeting quantities

Plan, layout, and install carpeting according to manufacturer's instructions

Competency: Finish interior trim and molding



Tasks: Case and trim interior door and windows

Cut, fit, and install wall moldings such as coves, corner molds, and base trim

Competency: Identify surface treatment methods

Tasks: Define the terms associated with paints, seals, stains, and finishes, and their application

Explain the principles of surface finishing

Explain safety hazards specific to using paints and other finishing compounds

Explain relevant standard safety procedures:

a. Read manufacturer's warnings
b. Do not apply compounds containing asbestos and known or suspected carcinogens
c. Demonstrate proper use and care of painting supplies and equipment such as thinners, removers, rollers, brushes, and mechanical applicators

Competency: Apply paint, stain, finish, or sealants

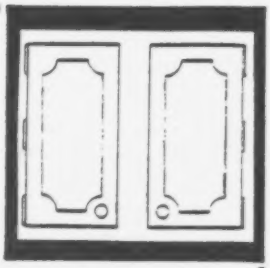
Tasks: Wear protective equipment, such as respirators and impervious gloves

Select correct finish according to building specifications

Follow manufacturer's instructions:

a. Prepare surfaces to be finished
b. Apply when weather and temperature are favorable
c. Maintain adequate ventillation

Cabinets



Competency: Identify cabinet construction methods

Tasks: Define the terms associated with cabinets and their construction and installation

Explain the principles associated with cabinets and their installation

Generate detailed cabinet schedules for a given kitchen, bathroom, and utility room

Explain relevant safety procedures

Competency: Construct a cabinet

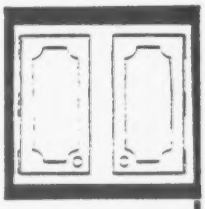
Tasks: Obtain cabinet design

Calculate materials

Plan, layout, cut, fit, and install cabinet components in the following order:

a. Construct the base
b. Construct bottom plane and risers
c. Cut and install back supports
d. Notch the back supports and install
e. Cut and install shelf supports and kickers
f. Cut and install partitions
g. Plumb end rises
h. End panels
i. Shelves
j. Rails
k. Miter stiles
l. Counter top
m. Edging

Finish surfaces as required



Competency: **Install pre-finished wall and base cabinets**

Tasks: Follow blueprints and manufacturer's instructions

Plumb, level, and secure base units, wall face frames, and vanities

Pre-fit counter sections to walls

Assemble counter tops and corners

Plumb, level, and fasten with screws and or adhesives

IV
Course Descriptions

Course Descriptions

The brief course descriptions provide conceptual frameworks for educational planners that seek to design and implement a balanced program in construction education. Teachers can use these descriptions to organize course offerings in construction education. These descriptions are examples of content organization and are too brief for purposes of program approval. Local schools will need to be much more definitive regarding the content of their courses than is reflected in these course descriptions.

Course: Construction I
Length: One year
Grades: 9-12

This program covers all of the basics of building a residential structure. The first course includes an introduction to: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets.

Course: Construction II
Length: One year
Grades: 10-12

This program covers all of the basics of building a residential structure. The second year course provides intermediate level skills in all of units taught in the first year course: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets. Only those students who have successfully completed Construction I should be enrolled in Construction II.

Course: Construction III
Length: One year
Grades: 11-12

This program covers all of the skills required to build a residential structure. This third year course includes advanced level training in: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets. Only those students who have successfully completed Construction I and II should be enrolled in Construction III.

Course: Construction IV
Length: One year
Grade: 12

This program covers all the skills required to build a residential structure. The fourth course is designed to build mastery-level skills in the following areas: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets. Only those students who have completed Construction I, II, and III should be enrolled in this senior-level construction course.

V
Curriculum Analysis Matrix

Curriculum Analysis Matrix

Identified Competencies by Course Offerings

This competency checklist should be used by teachers in identifying competencies to be included in specific classes in construction education. This checklist is a curriculum analysis tool for use by teachers in assigning responsibilities for the competencies of a total construction education program.

All courses taught in the construction education program are identified in the columns at the top of the matrix. The individual competencies can be allocated to specific courses. One method for analyzing the competency list is to assign letters where the competency will be introduced (I), taught (T), or mastered (M). Curriculum sequences can be organized through this approach.

To assist construction teachers to reinforce basic skills instruction, competencies have been cross-referenced with the following academic areas:

Math (M)	Science (S)
Social Studies (SS)	Language Arts (LA)

This will assist local school districts in awarding cross-credit (academic credit) for participation in vocational classes they deem appropriate.

The following checklists are also cross-referenced with the Job Training Partnership Act pre-employment competencies and student leadership competencies. The Job Training Partnership Act provides funds to train economically disadvantaged youth to enter and succeed in employment. Each Private Industry Council responsible for administering these funds adopted youth pre-employment competencies as one of the measures for positive termination for program participants. The other measures are attained through unsubsidized employment, or through another training program.

The following categories of work-related knowledge must be evaluated and measured in the course of a participant's enrollment in a JTPA program:

1. Pre-Employment Competencies, which require the participant to demonstrate the skills and knowledge necessary to identify career objectives, seek and obtain employment and understand job performance.

2. Work Maturity Competencies, which require the participant to demonstrate the ability to apply skills in a training position.

3. Educational Skills Competencies, which require the participant to demonstrate basic computation and communication skills necessary to enter the labor market.

4. Occupational Skills Competencies, which require that the participant demonstrate proficiency in those skills necessary to maintain employment in a specific occupation or occupational cluster.

The pre-employment and work maturity competencies have been specifically cross-referenced in this curriculum so that construction instructors could specify where these competencies are integrated into the curriculum.

These youth competencies were identified by the Vice Presidents of the Task Force on Youth Employment, Private Sector/Education Roundtables: Summary Report 1979 as critical elements for employability of the nation's youth.

Student leadership programs are designed to be an integral part of the curriculum. The competencies are reinforced by student participation in approved student organizations such as Vocational Industrial Clubs of America. The student leadership competencies have been cross-referenced in this handbook to assist the construction education instructor identify specifically where these competencies will be taught.

VOCATIONAL INDUSTRIAL CLUBS OF AMERICA (VICA)

Vocational Industrial Clubs of America (VICA) is for students enrolled in secondary and postsecondary vocational courses in trade, industrial, technical and health education.

Through planned club activities, VICA develops the "whole" student, social and leadership abilities as well as vocational skills. The VICA motto is "Preparing for Leadership in the World of Work." VICA goals include:

- Foster an understanding of the functions of labor and management organizations and a recognition of their interdependence.
- Foster respect for the dignity of work.
- Relate school experiences to a young person's search for meaning, identity and achievement.
- Teach young people how to live and work with others...to accept and be accepted.
- Offer activities that complement occupational skill development.

- Create interest in and stimulate favorable community response to trade, industrial, technical and health occupations education.
- Promote high standards in work ethics, craftsmanship, scholarship and safety.
- Help students understand their roles in a technological age.

Alaska VICA, chartered in 1973, serves about 140 members in 10 chapters. The national organization is located in Leesburg, Virginia.

KEY

M	Math
SS	Social Studies
S	Science
LA	Language Arts
*	Pre-Employment Competencies
+	Student Leadership Competencies

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
	EMPLOYABILITY SKILLS						
SS	Identify major purposes of carpentry and construction						
* SS	Identify construction careers						
* + LA	Identify career choices						
* + LA	Prepare a resume and job application						
* LA	Write a cover letter						
* LA	Prepare for an interview						
* LA	Follow up the interview						
* +	Be reliable and dependable						
* +	Maintain good personal relations						
* +	Be honest						
*	Demonstrate initiative and productivity						

Recommended Competencies by Course Offerings

	Competencies	Construction I	Construction II	Construction III	Construction IV		
* +	Be assertive						
* +	Demonstrate work maturity						
* +	Use effective leadership skills						
* + LA	Solve problems						
* + SS	Identify employee rights and responsibilities						
* +	Identify personal responsibilities related to employment						
* S	Maintain good health for effective job performance						
S SS	Prevent work-related injuries						
SS	Follow OSHA guidelines						
* + LA	Apply reading and writing skills						
* + LA	Follow verbal and written directions						
* LA	Identify proper job termination procedures						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
	HEALTH AND SAFETY						
S	Identify the types of health and safety hazards in residential construction						
* SS	Identify employee rights related to job hazards						
SS	Identify the elements of safe job sites						
S	Identify the hazards associated with excavations						
S	Identify heavy equipment safety procedures						
S	Control space heater hazards						
S	Prevent fires						
S	Control electrical hazards						
S	Prevent lung injuries						
S	Prevent skin injuries						
S	Prevent injuries from falls						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
S	Prevent injuries from falling objects						
S	Prevent eye injuries						
S	Prevent hearing damage						
S	Prevent lifting injuries						
*	Wear safe work clothing						
S	Prevent cold weather injuries						
	HAND TOOL SAFETY						
	Use and care for hand tools appropriately						
	POWER TOOL SAFETY						
	Use and care for power tools appropriately						
	MEASUREMENT AND MATHEMATICS						
M	Explain the importance of math and measurement						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
M	Use and care for measuring tools properly						
M	Calculate using fractions						
M	Draw and measure geometric figures						
	BLUEPRINT READING						
LA M	Identify uses of plot plans, blueprints, specifications and building codes						
LA M	Use a plot plan						
LA	Use the alphabet of lines						
LA	Use floor plan symbols						
LA	Use electrical symbols						
LA	Use sectioning symbols						
LA M	Use architects scale						
	Use door and window schedule symbols						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
M LA	Use foundation plans						
M LA	Use floor plans						
M LA	Use an elevation plan						
M	Use Section Thru Sill and Section Thru Cornice						
M LA	Use specifications						
	ENERGY						
M S SS LA	Understand energy conservation						
M S	Calculate your structure's energy needs						
	MATERIALS						
S	Identify the materials commonly used in northern residential construction						
S M	Identify wood growing, milling, curing, grading and scaling methods						
S	Identify wood sheet products						

	Recommended Competencies by Course Offerings Competencies	Construction I	Construction II	Construction III	Construction IV		
	Identify other building materials						
S M	Conserve materials and energy						
	INSULATION						
S M	Identify residential insulation systems appropriate for your locale						
S M	Insulate foundation system for local conditions						
S M	Insulate floor system						
S M	Insulate exterior wall systems						
S M	Insulate ceiling and/or roof systems						
S M	Ventilate the roof cavity system and provide access to the attic						
S M	Insulate water and wastewater systems						
	Maintain integrity of all insulation and vapor barriers						
	SITE SELECTION						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
	SITE SELECTION						
SS LA	Identify the legal considerations in siting a structure in your locale						
S SS LA	Identify the environmental/safety concerns related to siting						
M LA	Use a plot plan						
S M	Use a transit and leveling rod						
M	Square a building						
LA SS	Follow building permits and codes						
	FOUNDATIONS AND FORMING						
S	Identify the purposes of foundation systems						
S M	Identify factors to consider before deciding on foundation type						
	Construct foundation systems						
	Install insulation, weatherization, and pest and moisture management systems						

Recommended Competencies by Course Offerings

	Competencies	Construction I	Construction II	Construction III	Construction IV		
	MASONRY AND CONCRETE						
S M	Identify the steps involved in pouring concrete foundations						
	Prepare site subsurface and forms						
M	Compute the volume of concrete required						
	Use and maintain concrete tools and equipment properly						
M	Plan a concrete pour						
S	Finish concrete						
	BLOCKS AND BRICKS						
S M	Organize job site						
M	Lay and mortar blocks						
	Identify other masonry skills						
	FRAMING: SUBFLOOR/FLOOR						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
S M	Identify energy-efficient framing systems for your locale						
S M	Frame and insulate various floor systems						
M	Install a floor support system						
M	Frame a sill						
S M	Construct energy-efficient floor systems						
M	Install sub-floor						
	FRAMING: WALLS						
S M	Identify the principles of energy-efficient wall construction for northern locales						
M	Layout exterior walls						
M	Construct exterior walls						
S	Install different types of wall sheathing						
M	Rough-in window and door openings						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
M	Construct interior walls						
S M	Identify the principles of stair construction						
M LA	Construct stairs according to building plans						
M	Layout stringer						
M	Assemble the stairs						
	FRAMING: ROOFING						
S	Identify the principles of energy-efficient cold region roof framing						
S M	Install ceiling systems						
	Construct hip-type roof						
M	Lay off rafter locations						
M	Calculate rafter lengths						
M	Cut and install rafters						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
M	Cut birdsmouth or seat						
S M	Identify the principles of truss construction						
M	Construct a truss						
	Set, align and brace truss						
S	Complete other roof features						
M	Sheath roof						
	ROOF FINISHING						
S M	Identify energy-efficient roofing systems appropriate to your structure						
M	Apply roofing						
	PLUMBING AND HEATING						
S M	Identify plumbing systems						
S M	Install plastic water and wastewater pipes						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
S	Install copper pipe and tubing						
S M	Install water supply and wastewater systems						
S M	Insulate and/or bury pipe for your locale						
S M	Install heaters and heat exchange systems						
S M	Install air and moisture management systems						
	WIRING						
S M	Identify residential electrical systems						
S M	Design a residential electrical system						
S M	Rough-in electrical system						
S M	Connect and trim residential electrical system						
	WINDOWS AND DOORS						
S M	Identify energy-efficient window systems and installation strategies						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
S M	Install energy-efficient windows						
S M	Identify energy-efficient door systems and installation methods						
M	Fit and assemble exterior jamb set						
M	Install exterior door unit						
M	Fit and assemble interior door jamb set						
M	Install interior door unit						
M	Install locks						
M	Fit and install interior doorstops						
M	Install special operating doors						
	EXTERIOR FINISH						
S M	Identify exterior finish systems						
M	Install cornice trim						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
S M	Identify siding options						
M	Apply siding materials and trim						
	INTERIOR FINISH						
S M	Identify ceiling finish systems						
M	Install ceiling						
S M	Identify wall finish systems						
S M	Apply wall finish systems						
S M	Identify gypsum board walls and ceilings						
M	Install gypsum board						
	Finish and texture gypsum board						
M	Complete stairs and trim						
M	Identify different types of flooring						

Recommended Competencies by Course Offerings Competencies		Construction I	Construction II	Construction III	Construction IV		
M	Install underlayment						
M	Lay a hardwood strip floor						
M	Lay a resilient tile floor						
M	Install paneling						
M	Install carpeting						
	Finish interior trim and molding						
S	Identify surface treatment methods						
	Apply paint, stain, finish, or sealants						
	CABINETS						
M	Identify cabinet construction methods						
M	Construct a cabinet						
M	Install pre-finished wall and base cabinets						

VI
Sample Skills Card

Sample Skills Card

This section of the guide provides teachers with an example format of an instrument for evaluating the effectiveness of instruction. The skills record allows teachers to assess competency at four levels of proficiency. Teachers are encouraged to construct their own skills performance record using the competency lists in the curriculum section of this guide.

Instructions for Use

The list of vocational skills/traits was developed from a task analysis of a construction competency.

LEVEL CODE KEY:

1 Introductory Level: Can do simple parts of task. Needs to be told/shown how to do most of the task. Needs extremely close supervision.

2 Minimum Level: Can do most parts of the task. Needs help only with most difficult parts. Needs close supervision.

3 Average Level: Can do all parts of task. Needs only spot-check of completed work. Meets local demands for speed and accuracy. Needs moderate job entry supervision.

4 Proficiency Level: Can complete task quickly and accurately. Can direct others in how to do the task. Needs little supervision.

DIRECTIONS: The instructor/employer may write, date and initial in appropriate square.

Fit and assemble interior door jamb set

1	2	3	4	
				- Select door and collect jamb materials
				- Bevel door
				- Cut matching hinge gains in door and side jambs
				- Cut jamb, allowing for proper clearance and uneven floors
				- Assemble jamb set
				- Attach hinges and connect door to jamb

COMMENTS:

VII
Suggested Resources

Suggested Resources

This section identifies specific resources and sources for finding instructional materials and supplies for construction.

The following source lists have been characterized by media type to facilitate teacher use: resource libraries, publishers of texts and instructional materials, state resources, periodicals, associations, special books and pamphlets, multi-media and materials suppliers.

The Alaska Department of Education has not formally reviewed nor approved all the resources listed in this section. Teachers are encouraged to preview materials before using them in the classroom.

Resource Libraries

Alaska Vocational Materials Library
Office of Adult & Vocational Education
Alaska State Department of Education
Box F
Juneau, AK 99811
(907) 465-2980

- Alaska Energy Education Series Appropriate Technology for Alaskans
- Basic Skills For The Trades
- Building in the North
- Choices & Challenges: A Teen Woman's and Young Man's Journal for Self-Awareness and Personal Planning
- Cooperative Education and On-The-Job Training Handbook
- Energy Conservation in Construction Trades
- Go For It! Women Working in Construction-Related Trades in Alaska (video)
- Home Energy Conservation Techniques (Videos)
- Local Advisory Committee: Handbook for Vocational Administrators
- Pre-Employment Competencies Resource Guide
- Sled Construction
- The How Book on Dog Sled Construction & Equipment
- Uluaq Construction
- Safety and School Shop Planning
- STARS: Secondary Training For Alaska

The Library maintains curricula for all vocational areas. Resources are loaned for a 2 month review period. There are also many materials which may be purchased from the Library's special collections. Some materials are available free of charge.

The Library's catalog is computerized and may be operated on an Apple Computer using Appleworks Software. The catalog may be obtained by sending $10.00 (please make your check payable to the South East Regional Resource Center) or by sending five blank disks for duplication.

Alaska Career Information System
Office of Adult and Vocational Education
Alaska State Department of Education
Box F
Juneau, AK 99811
(907) 465-2980

- Comprehensive career guidance system developed by Alaskans and for Alaskans seeking occupational and educational opportunities in and out of Alaska.

Alaska Health Sciences Library
3211 Providence Drive
Anchorage, AK
(907) 786-1870

- Journals and magazines in the area of job safety and health.

Alaska State Film Library
Juneau Center
Box G
Juneau, AK 99811
(907) 465-2916

- A Place To Live
- Alaskan Timber for Houses
- All Weather Wood Foundations
- Concrete Construction
- Foundation and Floor Constuction
- Housing: House Construction for the Arctic Climate
- Plumbing and Heating
- Roof Framing for the North
- Welding: Operation of Welding Equipment

Northwestern Vocational Curriculum
Coordination Center
St. Martin's College
Lacey, WA 98503

- 10-State regional library of vocational materials. Can be accessed through the Alaska Vocational Materials Library.

National Center for Research in
Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, OH 43210

- Vocational Education Curriculum Materials database of all 50 states. Can be accessed through the Alaska Vocational Materials Library.
- Catalog of materials available on construction education.

Publishers

American Technical Publishers, Inc.
12235 South Laramie Ave.
Alsip, IL 60658

Bennett & McKnight
A Division of Glencoe Publishing Co.
17337 Ventura Blvd.
Encino, CA 91316

Chilton Book Company
Chilton Way
Radnor, PA 19089

Craftsman Book Company
P.O. Box 6500
Carlsbad, CA 92008

Dancraft
Daniel International Corporation
301 North Main Street
Greenville, SC 29601

Delmar Publishers, Inc.
2 Computer Drive, West
Albany, NY 12212

Goodheart-Wilcox, Inc.
123 W. Taft Drive
South Holland, IL 60473

Hobart School of Welding Technology
Trade Square East
Troy, OH 48373

Industrial Press, Inc.
200 Madison Avenue
New York, NY 10016

Intertec Publishing Corporation
Technical Publications
P.O. Box 12901
Overland Park, KS 66212

Ken Cook Educational Systems
Worldwide
12855 W. Silver Spring Drive
P.O. Box 207
Butler, WI 53007

McGraw-Hill Book Co./Gregg Division
8171 Redwood Highway
Novato, CA 94947

Prakken Publications
P.O. Box 8623
Ann Arbor, MI 48107

Reston Publishing Company
P.O. Box 546
Reston, VA 22090

South Western Publishing Co.
5101 Madison Road
Cincinnati, OH 45227

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Technical Training Aids
P.O. Box 20042
Birmingham, AL 35216

Trade Press Publishing Co.
407 E. Michigan Street
Milwaukee, WI 53201

State Resources

Curriculum Publications Clearinghouse
Western Illinois University
Horrabin Hall Y6
Macomb, IL 61455

- Competency-Based Pre-Service Construction Trades Curriculum
- Vocational-Technical Education Consortium of States (V-TECS) Catalogs of performance objectives

Curriculum and Instructional Materials Center (CIMC)
Oklahoma State Department of Vocational & Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074

- Bricklaying
- Cement Masonry
- General Construction Trades
- Industrial Electricity and Electronics
- Millwright
- Residential Carpentry

Curriculum Development Unit
Office of Vocational Education
2024 Capital Plaza Tower
Frankfort, KY 40601

- Competency-Based Materials for Carpentry, Masonry and Welding

Instructional Materials Laboratory
10 Industrial Education Bldg.
University of Missouri-Columbia
Columbia, MO 65211

- Building Trades
- Concrete Masonry
- Electrical
- Math
- Metric Measurement
- Plumbing
- Welding

Michigan Vocational Education Resource Center 133 Erickson Hall Michigan State University East Lansing, MI 48824	. Construction Trade Series . Welding
Mid-America Vocational Curriculum Consortium (MAVCC) 1500 West Seventh Ave. Stillwater, OK 74074	. Basic Electronics Book I & II . Residential Plumbing . Residential Solar Systems . Residential Wiring . Sheet Metal Series . Welding Series
Minnesota Curriculum Services Center 3554 White Bear Avenue White Bear Lake, MN 55110	. Carpentry . Heating and Air Conditioning . Masonry . Superinsulation in Housing Construction . Welding Occupations Terminal Performance Objectives
Occupational Curriculum Laboratory East Texas State University Mayo Hall, Room 213 Commerce, TX 75428	. General Construction Trades I,II . General Metal Trades I-IV
Ohio Instructional Materials Laboratory The Ohio State University 154 W. 12th Ave. Room 139 Columbus, OH 43210	. Shop Safety
Portland State University Division of Continuing Education P.O. Box 1491 Portland, OR 97207	. Individualized Learning Systems for Construction, Drafting, Electrical, and Welding
University of Texas at Austin P.O. Box 7218 Austin, TX 78713	. Bricklayer and Stonemason . Cabinetmaker . Carpentry I, II . Construction Technology Woodworking Technology
Vocational Studies Center University of Wisconsin - Madison 964 Educational Sciences Bldg. 1025 West Johnson Street Madison, WI 53706	. Carpentry Business Modules . Construction Electrician Business . Plumbing Business Modules . Tools, Equipment & Machinery: Adapted for Vocational Education and the Employment of Handicapped People . Welding Business Modules

Associations

American Association for Vocational Instructional Materials (AAVIM)
120 Driftmeir Engineering Center
Athens, GA 30602

- Arc Welding
- Assisting Students in Improving Their Basic Skills
- Building Materials Costs (Computer Software)
- Concrete and Concrete Masonry
- Construction: Basic Principles
- Developing Shop Safety
- Drywall
- Electrical Wiring
- Fundamentals of Carpentry I
- How to Paint Your House
- Maintaining the Lighting & Wiring System
- Masonry Simplified
- Measurement & Layout Tools (Computer Software)
- Metals & Welding
- Plumbing Installation and Design
- Power Tool Safety Operation
- Rafter Layout in the Framing Square for School & Home Workshop
- Residential Carpentry
- Shop Planning
- Understanding & Measuring Power
- Understanding Electricity & Electrical Terms
- Welding Skills

American Technical Society
12235 So. Laramie Ave.
Alsip, IL 60658

- Building Trades Blueprint Reading
- Related Mathematics for Carpenters

American Vocational Association (AVA)
1410 King Street
Alexandria, VA 22314

- Construction Electrician Business
- Energy Specialist
- Fundamentals of Electricity and Electronics
- Instructional Materials for AC/Heating

American Welding Society
550 NW LeJeune Road
P.O. Box 351040
Miami, FL 33135

- Materials on Welding Fundamentals and Processes, Metallurgy, Safety and Health, Filler Metals, Inspection and Qualification

Associated Builders & Contractors
729 15th Street N.W.
Washington, DC 20005

- Wheels of Learning Instructional Materials

Associated General Contractors of America 1957 E. Street N.W. Washington, DC 20006	. Bricklaying . Cement Masonry . Construction and Residential Carpentry Series . Construction Craftsman . Manual of Accident Prevention in Construction
Instrument Society of America 67 Alexander Drive P.O. Box 12277 Research Triangle Park, NC 27709	. Publications & Training Aids Catalog
International Association of Plumbing & Mechanical Officials IAPMO Hdgs 5032 Alhambra Avenue Los Angeles, CA 90032	. Uniform Plumbing Code
National Institute for Occupational Safety and Health 321 Second Avenue Mail Stop 502 Seattle, WA	. Provides technical information, assistance and publications on job safety and health
Occupational Safety and Health Administration U.S. Federal Court Building RoomC543 701 C Street Box 29 Anchorage, AK 99503	. OSHA Regulations
Painting and Decorating Contractors of America 7223 Lee Highway Falls Church, VA 22046	. Painting & Decorating Craftsman's Manual
United Brotherhood of Carpenters and Joiners of America 101 Constitution Avenue NW Washington, DC 20001	. Carpentry Apprentice Training Course
Vocational Industrial Clubs of America (VICA) P.O. Box 3000 Leesburg, VA 22075	. Advisor Guide/Integrating VICA into the Trades & Industrial Program . National Leadership Handbook

Periodicals

American Industrial Arts Association
1914 Association Drive
Reston, VA 22091
. The Technology Teacher

Associated General Contractors of America
1957 E. Street N.W.
Washington, DC 20006
. The Constructor Magazine

Cummins Publishing Company
31600 Telegraph Road, Suite 200
Birmingham, MI 48010
. Industrial Education

Energy Publications Inc.
P.O. Box 2008
Laconia, NH 03247
. WoodHeat

National Association of Home Builders of the United States
15th and M Streets NW
Washington, DC 20005
. The NAHB Journal of Home Building

Prakken Publications
P.O. Box 8623
Ann Arbor, MI 48107
. School Shop

Solar Vision, Inc.
P.O. 8420
Philadelphia, PA 19101
. Progressive Builder: Energy Efficiency and Quality Home Construction

Taunton Press, Inc.
P.O. Box 355
Newton, CT 06470
. Fine Homebuilding
. Fine Woodworking

United Brotherhood of Carpenters and Joiners of America
101 Constitution Avenue NW
Washington, DC 20001
. The Carpenter Magazine

Vernon Publications, Inc.
109 W. Mercer Street
Seattle, WA 98119
. Alaska Construction and Oil

Workbench Magazine
4251 Pennsylvania Avenue
Kansas City, MO 64111

- Workbench Magazine

Special Books/Pamphlets

Alaska Health Project
417 West Eighth Ave.
Anchorage, AK 99501

- Alaskan Health Hazards in the Workplace: It's Your Right to Know
- Keep This In Your Tool Box: A Health & Safety Manual for Alaska Construction Workers

Better Homes and Gardens
Meredith Corporation
Des Moines, IA

- Do-It-Yourself Home Repairs

Centennial College Press
651 Warden Avenue
Scarborough, Ont. MIL 3Z6 Canada

- Construction Geometry

Cooperative Extension Service
Statewide Office
University of Alaska
303 Tanana Drive
Fairbanks, AK 99701

- Alaska Dwelling Construction Guide
- Design of Roofs for Northern Residential Construction
- Effects of Insulation on Energy Requirements of a Residence
- Home Heating Systems/Fuels/ Controls
- Housing & Energy Construction Materials
- How to Install Insulation for Ceilings, Walls, Floors and Basements
- Know the Soil You Build On
- Maintaining Subsurface Drains
- Painting Inside & Out
- Permafrost--A Problem of Building in Alaska
- Permeability of Common Building Materials to Water Vapor
- Simple Plumbing Repairs For The Home
- Special Considerations for Building in Alaska
- Warm Floors are Essential for Comfort
- Wood Finishing Series

Creative Home Owner Press
A Division of Federal Marketing Corporation
24 Park Way
Upper Saddle River, NJ 07458

- Heating, Cooling and Ventilation
- Plumbing for Old and New Homes
- Tile Indoors and Out

Hearst Books
William Morrow and Co., Inc.
105 Madison Avenue
New York, NY 10016

- The Good Housekeeping Illustrated Book of Home Maintenance

Ortho Books
Chevron Chemical Company
575 Market Street
San Francisco, CA 94105

- All About Basic Home Repairs
- Basic & Finish Carpentry Techniques
- Basic Masonry Techniques
- Basic Plumbing Techniques
- Basic Remodeling Techniques
- Basic Wiring Techniques
- Energy Saving Projects for the Home
- Home Improvement Encyclopedia
- How To Build and Use Greenhouses
- Painting and Wallpapering

Reader's Digest Association, Inc.
Pleasantville, NY

- Home Improvements Manual
- Reader's Digest Complete Do-It-Yourself Manual

Rodale Press, Inc.
Emmaus, PA 18049

- Low-Cost, Energy Efficient Shelter for the Owner & Builder
- Movable Insulation

R.S. Means Company, Inc.
Construction Consultants and Publishers
100 Constitution Plaza
P.O. Box 800
Kingston, MA 02364

- Means Illustrated Construction Dictionary

Sunset Books
Lane Publishing Company
Menlo Park, CA 94025

- Basic Carpentry
- Basic Home Repairs
- Basic Home Wiring
- Basic Masonry
- Do-It-Yourself Energy Savings Projects
- Do-It-Yourself Floors
- Home Lighting
- Home Repair Handbook
- Home How-To Sourcebook
- Insulation and Weatherstripping
- Solar Heating & Cooling

Ten Speed Press
PO Box 7123
Berkeley, CA 94704

. Before You Build: A Pre-Construction Guide
. Building Your Own House
. The Complete Woodworker
. The Practical Woodworker

Multi-Media Materials

Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965

Career Aids, Inc.
20417 Nordhoff Street, Dept SW8
Chatsworth, CA 91311

Dana Corporation
School Assistance
Box 453
Toledo, OH 43692

DCA Educational Products, Inc.
4685 Stenton Ave
Philadelphia, PA 19144

Edu-Tech Publications Division
Commercial Service Co.
Box 2499
Anderson, IN 46011

EMC Publishing Co.
Changing Times Education Service
300 York Ave.
Saint Paul, MN 55101

Hobar Publications
1234 Tiller Lane
St. Paul, MN 55112

Masonry Specialty Company
4430 Gibsonia Road, RT 910
Gibsonia, PA 15044

Meridian Educational Corp.
Library Filmstrip Center
205 E. Locust Street
Bloomington, IL 61701

National Archives & Records Administration
National Audiovisual Center
8700 Edgeworth Drive
Capitol Heights, MD 20743

National Innovative Media Co.
Route #2, Box 301 B
Calhoun, KY 42327

Pictures, Inc.
811 W. 8th Ave.
Anchorage, AK 99501

Teaching Aids, Inc.
P.O. Box 1798
Costa Mesa, CA 92626

The Media Center
State Fair Community College
1900 Clarendon Road
Sedalia, MO 65301

Vocational Media Associates
Prentice-Hall Media
P.O. Box 1050
Mount Kisco, NY 10549

VTR-Industrial Training
Video Training Resources, Inc.
7500 West 78 Street
Edina, MN 55435

Materials Suppliers

Advance Process Supply Co.
400 N. Noble Street
Chicago, IL 60622

Allied Electronics
401 E. 8th Street
Fort Worth, TX 76102

Broadhead-Garrett Co.
Western Division
161 Commerce Circle
P.O. Box 15528
Sacramento, CA 95852

Buckner-Weatherby Company, Inc.
5931 Fourth Ave. South
Seattle, WA 98108

Delvies Plastics, Inc.
P.O. Box 1415
Salt Lake City, UT 84110

Enco Manufacturing Co.
5000 W. Bloomingdale
Chicago, IL 60639

Industrial Arts Supply Co.
5724 West 36th Street
St. Louis Park, MN 55416

John Deere and Company
Distribution Service Center, Dept 150
1400 3rd Avenue
Moline, IL 61265

Midwest Shop Supplies, Inc.
2600 Bridgeport
P.O. Box 3717
Sioux City, IA 51102

Modern School Supplies, Inc.
P.O. Box 958
Hartford, CT 06143

Northern Hydraulics, Inc
P.O Box 1499
Burnsville, MN 55337

SATCO
A Division of Saterlee
924 South 19th Ave.
Minneapolis, MN 55404

Sears, Roebuck & Co.
Sears Tower
Chicago, IL 60684

Snap-On-Tools Corp.
2801 80th Street
Kenosha, WI 53204

T & W Systems
7372 Prince Drive
Huntington Beach, CA 92647

Woodcraft Supply Corp.
Dept FB 125
41 Atlantic Ave Box 4000
Woburn, MA 01888